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• **No loading** machine can perform better than the transportation system that serves it. On this basis, the No. 1 mine of the Norton Coal Corporation, in western Kentucky, takes its place among the leaders with an average of 210 car changes per shift. How Norton does it—and how it uses black powder in steel shells for shooting at its Crabtree mine—are described in the article on p. 29.

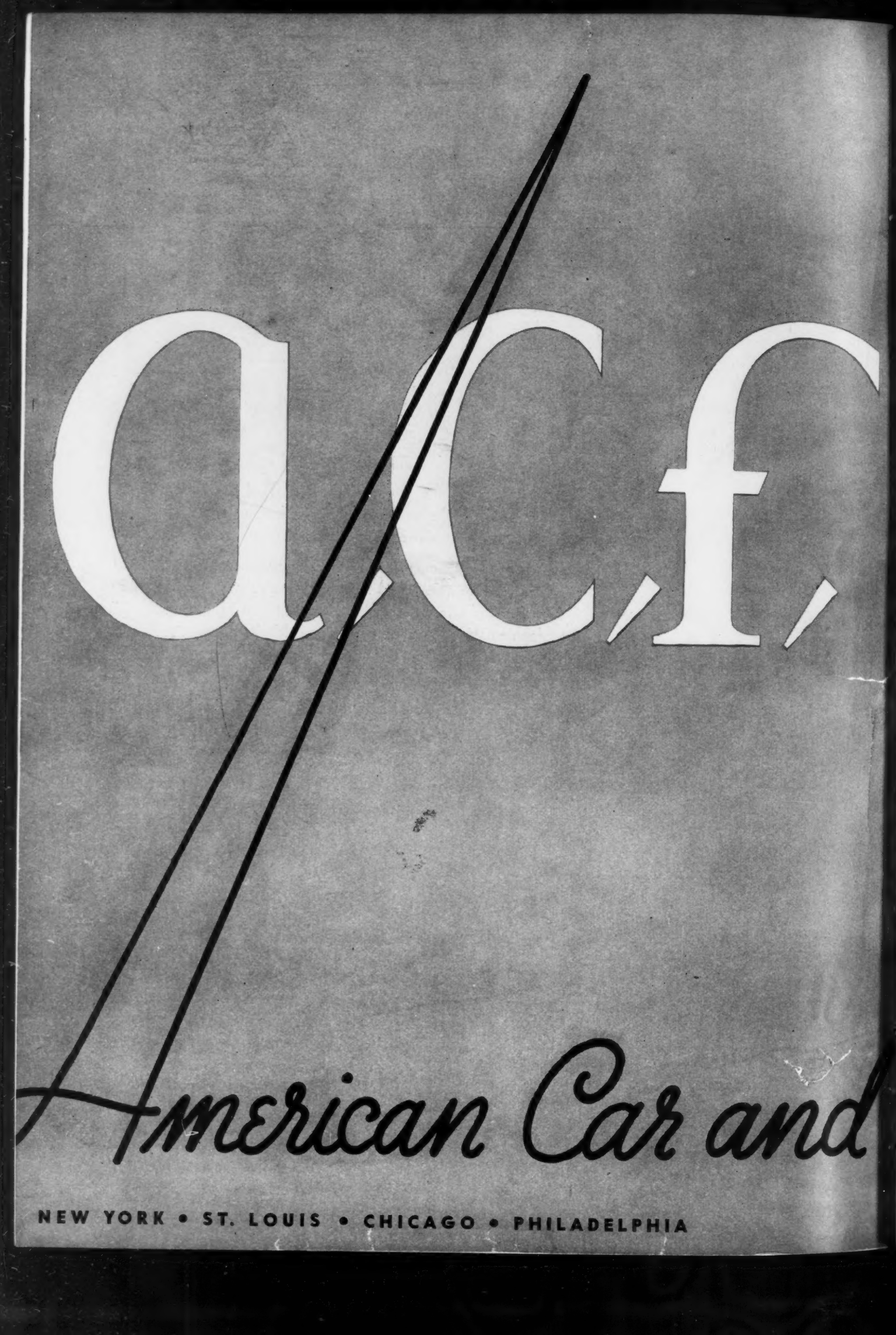
• **Squawks** from the inner man bring visions of steaks with all the fixings, including tomatoes, cucumbers and lettuce, not to mention spinach and other members of the vegetable family. "Stewed Black Diamonds" appear on no menu. Nevertheless, coal grows lots of "vittles," as in Ohio, leader in hothouse-vegetable production. Coal Age brings you an investigation report in the July issue.

• **Crystal gazing** seldom is practiced in mine offices, but now that New York is but a memory, bituminous operators are casting an eye to the future. With consumer stocks in the East depleted 20,000,000 tons by the Appalachian stoppage, replenishments are in order. Eastern and Southern mines therefore may expect good business, with slack leading the field, says G. B. Gould in reviewing the situation in the article starting on p. 33.

• **"Get it down fast"** is the watchword in shaft sinking. So the C. H. Mead Coal Co., in southern West Virginia, put down a 350-ft. air opening in 82 days, pre-grouting test holes to prevent the inflow of water. A substantial increase in air circulation with a cut in fan horsepower are among the benefits listed by William Yates, who will describe the work in the next issue of Coal Age.

• **Cincinnati** has come and gone but its wealth of information on operating methods and equipment reflects Old King Coal's determined refusal to lie down and die. For those who went—and especially for those who didn't—Coal Age summarizes the technical sessions in the report beginning on p. 51 and follows through with a 16-page review of the latest advances in mining equipment on p. 59.

• **Has steel** a major place in the mine-timbering picture? Coal-mining men in search of an answer to this question will find help in Dr. R. G. Wuerker's series of three articles reviewing European developments and practices. The first article, discussing arches and rings, is scheduled for early publication, and will be followed by analyses of steel-shaft timbering and supports for working places.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COAL AGE

Established 1911—McGraw-Hill Publishing Company, Inc.

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

JUNE, 1939

Pertinent and Impertinent

• IF THE PRESIDENT'S latest plan holding it "necessary to accomplish the purposes of the Reorganization Act to abolish the National Bituminous Coal Commission" had stopped right there instead of continuing with "and transfer its functions to the Secretary of the Interior," there might have been jubilant dancing in the village streets and bonfires in the mountain camps. As a fact-finding and statistical-recording agency the Coal Commission has undoubted merit, but its attempts to reconcile the irreconcilable certainly have played hob with the industry to date.

• TOO BAD the Appalachian wage negotiators' personally conducted tour to Washington last month could not have been staged when the cherry trees were in bloom. It might have added an artistic touch of color to a drab day.

• NOT SO LONG AGO the board of an important coal-producing company was asked to authorize the installation of a dedusting plant at one of its mines. The request, involving an expenditure of less than $75,000, originated with the sales department, which was having a hard time marketing the company's stoker coal in competition with more modernly equipped operations. Although it was estimated that the capital investment could be recovered in a few months through increased realization on a premium product, the directors said, "no." With the sales department still on the defensive trying to sell a product alert retailers and consumers won't buy, an impertinent inquirer might ask who is saving money and who is losing profits.

• ANOTHER COMMENTATOR calls coal "a sick industry in any case" and proceeds to explain the inexplicable "coal strike," which actually did not exist, to her host of readers in great and forceful detail. But why Dorothy Thompson should "deprive the workers of any opportunity ever to change their minds and ever to change their union"—assuming they want to strike off their UMW shackles—by the present union-shop agreement is going just a bit too far. If the present Wagner law prohibits a majority of the employees in a bargaining unit from changing their allegiance to another union at the termination of a wage contract, the National Labor Relations Act must have been rewritten without anyone's knowledge. Forever and ever is a long, long time, Dorothy.

• FOR YEARS superficial economists have delighted in bracketing coal and textiles as the sick children of industry. And both patients have repeatedly confounded the diagnosticians with a resiliency in bouncing out of disasters which would have engulfed many stronger industries. But now comes news that really ought to make leaders in the coal-mining industry sick. While bituminous coal is straining to collect a piddling $235,000 per year to finance a research pro-

gram, a movement is on foot to set up a $25 000,000 fund for textiles! Time to raise your sights, brethren?

• SOME GOOD STARTS have been made in the publication of employee editions of annual reports, remarks Paul Garrett, director of public relations, General Motors Corporation. The movement is salutary because it answers a common human desire to know what is going on. "Once we learn how to produce a report that employees can understand," he adds, "we might do well to send a few to stockholders, for the average annual report is still designed more for financial people and market analysts than the run-of-mine stockholder."

Who Won?

IN SO FAR AS contracts can give it, the new Appalachian agreement is a smashing victory for the CIO wing of organized labor over its AFL rivals. The operators, caught in the middle of this labor feud, lost nothing. Wages, hours and working conditions which affect production costs are unchanged. Management rights are protected by specific contract provisions and by assurances given the conference by UMW leaders during the tense hours preceding the final acceptance of the new agreement. Disciplinary powers under the penalty clauses of the district agreements are unabridged.

Recognition of the Lewis union as the exclusive bargaining agent of the miners is nothing more than formal verbal acknowledgment of a fact that has existed since the first Appalachian compact of 1933. At most mines, particularly in the Northern fields and in the outlying non-Appalachian districts, membership in the UMW as a condition of employment should cause no disturbance in industrial relations. The great majority of workers in these mines already are members of the UMW. However offensive the idea of a "union" or closed-shop may be to some employers, such restrictive arrangements are permitted by the National Labor Relations Act and that statute is the law of the land.

The tragedy of the negotiations was not the acceptance of the Lewis terms but the long delay in reaching an agreement. That there would be no change in wages or hours was patent to impartial observers weeks before the conference began. That the UMW dared not recede from its demand for recognition and that many —if not a majority—of the operators were not unsympathetic to that demand if the penalty clauses were not eliminated also was equally clear in the closing days of March. All that was gained by the delay was an unfavorable press for the union, increasing public impatience with the industry as a whole and a still more favorable reception for coal's competitors. Such gains must be chalked up on the wrong side of the ledger.

Blending

TO MOST PERSONS, blending suggests the mixing of coal for the manufacture of coke. Too many have overlooked the great importance of blending also in changing the ash-fusion characteristics of non-coking coals, in obtaining a good ash, sulphur and B.t.u. analysis, and in preventing those wide variations in the coal analysis from hour to hour which so exasperate the consumer. Even if the operator does not provide special mixing facilities, he can arrange at least to survey his mines with their seam or seams analytically and from an ash-fusion standpoint to find the characteristics after washing all of the coal coming to the dump and to compound a formula of so many cars of this and so many cars of that to maintain uniformity.

Some mine owners with highly fusible or greatly variant ash have provided themselves with ample storage tracks and convenient switches, calculated their reserves of difficult and sweetener coals, and have made arrangements accordingly. Many, however, still mine the best coal first and then have to close down when the coal which should have served as a sweetener for the life of the operation is exhausted. Mixing is necessary even with mechanical cleaning because the purchasers of washed coal are more than usually finical, and the cleaning of a uniform raw product results in greater efficiency in cleaning and requires less washer capacity for both coal and rock.

Confusion Plus

CONFUSION and uncertainty have dogged bituminous-coal regulation since the signing of the Guffey-Vinson act two years ago. The Presidential reorganization plan submitted to Congress May 9 does not change this particular and unfortunate situation. Abolition of the National Bituminous Coal Commission may simplify the administrative structure, but the grave questions as to the workability of the statute itself remain unanswered. Transfer of the Commission's functions to the Secretary of the Interior neither adds to nor subtracts from the body of the law as it now stands.

Presumably, therefore, the effort to impose a rigid minimum-price system which will meet the fantastic coordination provisions of the act will continue. Presumably these prices will follow the 1937–38 pattern of penalizing the more efficient mines with unduly high minima while bankrupting the less efficient units with minimum prices substantially below actual production costs. Presumably, if some people have their way, many consumers will be denied the advantages of location and low-cost transportation. And the delay in promulgation of the minimum-price schedules may be further extended.

These criticisms are no reflection on the vanishing Commissioners nor upon the Secretary of the Interior, who is soon to take up their thankless task. The fault lies in the mandates of the Guffey-Vinson law. In their commendable, if misdirected, zeal to provide a formula for a millennium, the authors of the statute fashioned a straitjacket. And no administrator sticking inflexibly to the letter of the law itself can hope to wiggle out of its confines.

FAST CAR CHANGING

+ And Black Powder in Steel Shells

Feature Norton Mechanical Mining

An average of 210 car changes in seven hours with mules and men, and the use of black powder in steel shells to reduce screenings output 8 per cent are outstanding activities of the Norton Coal Corporation in western Kentucky. The car-changing record is being made in 4½-ft. coal at Nortonville No. 1 mine, while the cut in screenings output has been recorded at Crabtree, where the presence of impurity bands and a soft top shale which comes with the coal poses an unusually difficult face-preparation problem in mechanical loading. At both mines, intensive study has resulted in a system of changing sidetracks which reduces lost motion to a minimum. At Nortonville No. 1, this system has reached its peak in the changing record noted above.

NORTONVILLE No. 1 is a shaft operation, with production at present coming from a section of No. 9 coal averaging 54 in. Paradoxically, this seam is reached through entries in the No. 11 seam, which normally lies over the No. 9 but has been displaced an amount approximately equal to the interval by a fault. The shaft has been extended on down into the No. 9 coal, however, and when the present No. 9 territory is worked out—probably this summer—operations will be resumed in the lower level. The No. 9 dips an average of about 1½ per cent to the east in the present working territory, and the roof is a hard gray slate under 225 to 230 ft. of cover. The bottom also is slate. Production now comes from pit-car loaders in rooms (about 200 tons per day) and one Joy 8BU loading machine, which is double-shifted and on this basis produces approximately 500 tons per day. Additional loading equipment is contemplated when operations are shifted to the lower No. 9 territory.

In the present No. 9 workings at No. 1, where J. H. Tucker is mine manager, panel entries usually are driven at right angles to the dip and, depending upon the magnitude of the dip, the rooms may be turned either one or both ways from the entry, which is made up of two headings 15 ft. wide on 45-ft. centers. Rooms are turned at 90 deg., which puts them on the face. Width is 24 to 28 ft., while centers vary from 39 to 43 ft. Depth is 250 ft. and as a general rule no barrier pillar is left across the ends. Room necks are 15 ft. wide for about 20 ft., after which they are widened both ways.

The 8BU machine at No. 1 makes its own territory as it advances up a room entry. Usually, a total of five 28-ft. room faces, plus heading faces and crosscuts, are available for loading. When turning rooms both ways, two of the room faces will be on one side of the entry and three on the other, all advancing abreast. When the machine moves up, the numbers are reversed to keep one side of the panel from getting ahead. As the rooms are worked the headings are advanced one cut a day regularly, and at the same time new rooms are necked and driven in until they are widened out. The necessary switches and parting tracks are laid, and thus when one group of five rooms is worked out, another group—full width in each case—is available to move into. And as soon as a group of rooms is worked out, all the material is removed under the supervision of the loading-machine foreman ready for use in the next group. This requires an extra man for the period of removal only.

Aside from the foreman, Herbert Love, who has jurisdiction over both

One of the two men who tend cars is shown in this picture of the Nortonville No. 1 loading machine at work in a heading. With mule changing, this machine averages 210 cars per shift.

loading shifts and is largely responsible for the system in force and the loading results obtained, the 8BU crew consists of a Joy operator and helper, two cutters and drillers, one shotfirer, who also does the necessary timbering, one trackman and bottom scrapper, two drivers and two car tenders, who oversee placing and loading of the cars under the rear conveyor.

The coal at No. 1 is undercut with Goodman standard shortwalls equipped with 6½-ft. bars and Bowdil chains and bits. Chicago Pneumatic electric drills and Hardsoeg twisted augers, cutter heads and bits are used. A drill post designed by the coal company is mounted on each machine to permit both cutting and drilling to be done at the same time. Bottoms always are scrapped before the next cuts are made, to preserve height.

Shooting is done with both FF powder and King "Special C" permissible. To break down a 24-ft.-wide place, making about 24 tons of coal, four holes are drilled in the top about as indicated in Fig. 1. If permissible is being used, these holes are loaded with ten 1½x6-in. sticks, or about 3¼ lb. However, it is planned to use black powder in shells when the move to the lower level is made, or at least use this medium in times of good coarse-coal demand.

Cars at No. 1 hold an average of 2,300 lb. of coal. This small capacity results from the small shaft with consequent limitation on the size of car that can be hoisted. Changing methods are based on the installation of room partings running into single loading tracks approximately in the center of the place. The switch to the single loading track is kept within 20 to 50 ft. of the face, or, in other words, it is moved up every five or six cuts to keep changing distance to a minimum.

Normally, as indicated in Fig. 2, four cars are kept in a room at all times—such as two on the parting track, one at the loading machine and one on its way out to the parting on the entry. Entry partings, as indicated in Fig. 2, generally are about 125 ft. long, so that they will accommodate a trip of twelve cars, which is standard for the secondary haulage locomotive operating between these partings and the main-line sidetrack. This locomotive also gathers from the sidetrack serving the pit-car loaders. Coming in with an empty trip, the locomotive runs in on the loaded track and uses a chain, if necessary, to pull the empties past, whereupon it starts out with the loads. Empties are pulled in to the room parting two at a time by a mule. From the room parting two men take one car at a time to the loading machine and move it around. When filled, a mule pulls it to the entry parting track. At times, however, cars may be loaded two at a time. In this operation, the loading machine cleans out to the back of the cut and gets off the track, whereupon rails are laid to permit the cars to be run up to the solid coal, bringing the rear car of the two up far enough for the conveyor to reach it.

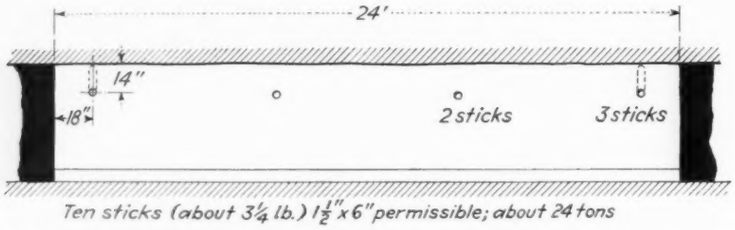


Fig. 1—Drilling diagram and average hole loading in a room face at the Nortonville No. 1 mine.

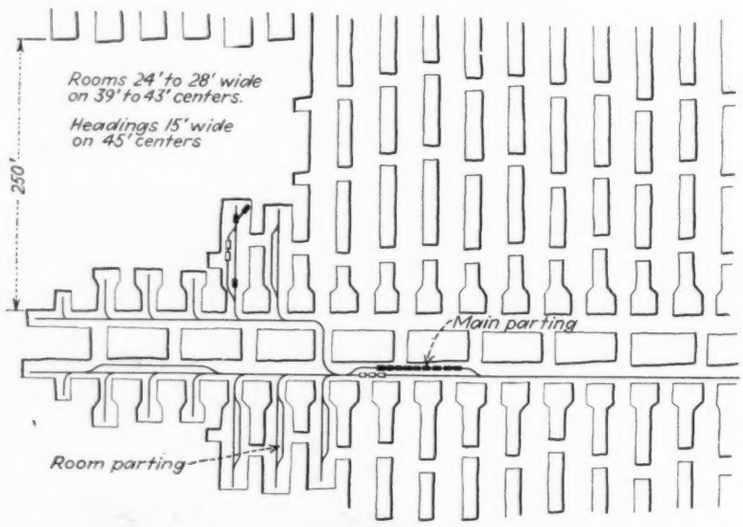


Fig. 2—Showing use of room parting to speed car-changing at Nortonville No. 1 mine. Five rooms, plus headings and crosscuts, comprise a loading-machine territory, and the machine does its own developing, as indicated.

Entry Partings Kept Up

The construction of entry partings is an integral part of the cycle of preparing for a new territory. These partings are about three rooms apart, and as the entry is advanced a switch is laid when the proper point is reached and two tracks are carried until it is time to lay the back switch to complete the parting. Construction of room partings is started as soon as the places are in far enough so a two-car parting can be laid. Then, as the face advances, the parting is lengthened by moving up the inby switch. And then, after a certain period of time, particularly if the material is needed, the outby switch is moved up to release the rails.

Prior to the adoption of the room partings, a number of schemes for reducing changing time were employed, of which the most-used was double tracks to the face. But in loading on two tracks it was found that the machine lost considerable time in each corner by having to change position to reach the far track, while if it loaded on the near track all the time it was necessary for the cars to wait at the switch down the room until the loads came out. Under the present system, a load has to travel only 20 to 50 ft. before an empty can start in and, as all loading is done on a single track, no out-of-the-normal change in loading-machine position is necessary. Consequently, it has been possible to maintain an average of 210 changes per shift, with a maximum of 225 and a minimum of 190.

The No. 11 seam is recovered at the company's Crabtree mine, Ilsley, Ky. This mine originally was a stripping. Even now, overburden over the deep-mine territory varies from only 50 to 75 ft. Deep mining started in 1936, and the first loading machine, a 7BU unit, with Devers Parker as foreman, was installed in 1938. A Jeffrey 44-D track-mounted

machine was placed in service in March, 1939, with a second scheduled to go in about April 1. The three loading machines are expected to produce about 900 tons per day, working one shift, with 150 to 200 tons additional from pit-car loaders used in driving entries. In times of good demand, part or all of the loading equipment will be double-shifted.

Thickness of the No. 11 coal at Crabtree, where B. J. Ashworth is mine manager under M. E. Conry, general superintendent for both this operation and Nortonville No. 1 mine, varies from 7 to 8 ft. It is overlaid by as much as 10 in. of soft shale which comes down when the coal is shot. Above the shale is a hard limestone which makes a very good roof. Underneath the coal is a soft fireclay. Consequently a coal bottom of about 4 in. is left to prevent loading this fireclay with the coal. The seam itself contains two regular bands, one a streak of sulphur up to ¾ in. in thickness about 18 in. down from the top and the other a "blue band," or shale parting, about 3 in. thick about 30 in. up from the bottom.

Grades Regulate Turning

Depending upon grades, rooms may be turned off one or both sides of the panel entries at Crabtree, which consist of two headings about 15 ft. wide on 45-ft. centers driven east and west. In general, panel length will be adjusted to provide about twenty rooms on one or both sides, as the case may be. To the east of the main entry, the dip is 3 to 4 per cent to the north and on this side of the mine therefore rooms are turned from one side of the panel entries only and are driven 300 ft. up the dip. A 30-ft. barrier pillar is left between the ends of the rooms and the next panel entry. To the west of the main entry, the coal flattens out and here it is planned to turn rooms both ways. The Jeffrey loading machines will work primarily in the west territory.

In 7BU territories, rooms are driven 40 ft. wide on 60-ft. centers, with necks 15 ft. wide for about 30 ft. in from the heading rib. Experiments are being carried out with angle faces (30 to 45 deg.), the centers remaining the same, which increases face length to 45 to 55 ft. With square faces, the loading section of the room track is in the center of the face, while with the angle faces the track is brought up along one rib and turned across the face. The major objective, inasmuch as only one car can be loaded at a time, as that is all a mule can handle, is a greater tonnage per machine move.

With the 44-D loaders, which have an effective reach of only 14 to 15 ft. on each side of the track centers, it is necessary, when driving 40-ft. places, to lay two tracks to the face, moving from one track to the other to complete the loading. Therefore, these machines will be worked in places 28 ft. wide on 43-ft. centers, laid with a single track to the face. By working out 28 instead of 20 ft. of coal from a track, machine moves will be reduced nearly one-third.

Undercutting is the practice at Crabtree, using Goodman universal machines with 7½-ft. bars equipped with Cincinnati and Goodman chains and double-ended bits. The coal is drilled with CP equipment using Coalmaster conveyor-type augers, cutting heads and bits. The conveyor auger is employed because its stiffness results in a straight hole, which is important with shell shooting. As the undercut is made, the bottom bench is blocked up to prevent it from falling until the kerf can be bugdusted and the other preliminary work completed.

The drilling plan in a 40-ft. square-faced room is shown in Fig. 3. Holes are put in by the cutting-machine crew, while bugdusting, removal of the blue band, shooting and removal of the top shale are done by a face-preparation crew. As indicated in Fig. 3, one hole is drilled in the blue band on each rib and is loaded with one-half stick of King "Special C" permissible running about 155 1½x6-in. stocks per 50-lb. box. After bugdusting is completed, the blocks are removed and the holes are fired to break the blue band along the ribs and permit the bottom bench, plus the band and 4 to 6 in. of coal above it, to drop to the floor. If it fails to drop, which seldom is the case, it is barred down. The preparation men then take out the blue band, separate it from the top coal which comes with it, and gob the band. As a result of this operation, a 12- to 15-in. space is left under the top bench, which gives the top coal a chance to roll out when it is shot. And, where conditions favor it, the top bench is snubbed to promote this rolling action.

With the blue band cleaned out,

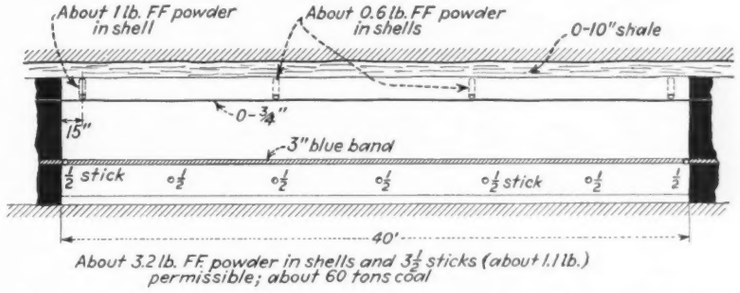


Fig. 3—Drilling diagram and average hole loading in a 40-ft. square face at Crabtree mine. The bottom bench is shot with permissible and the top with black powder in shells.

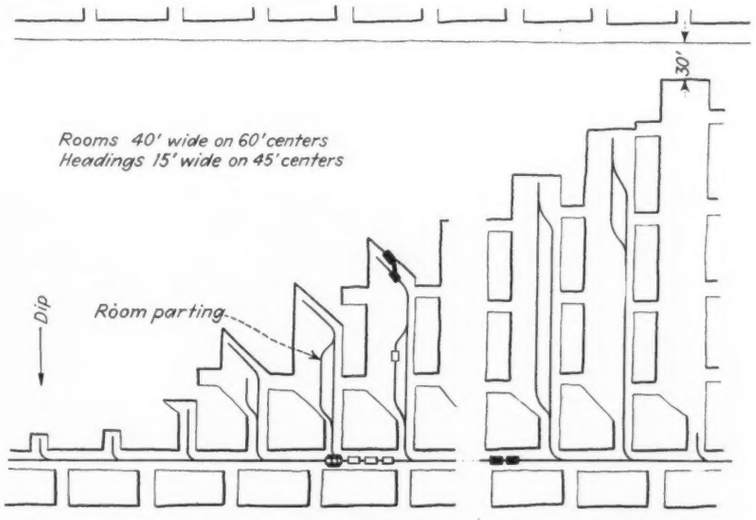


Fig. 4—Car-changing plan at Crabtree, showing diagrammatically room-track layouts for both square and angle faces.

the bottom bench, which nearly always comes down in a solid slab, is shot with one-half stick of "Special C" in each of five holes to crack it up. Then the top bench is shot down, using black-powder shells. The loading in each of the rib holes usually is about 1 lb. of FF powder in the form of a 1-in.-diameter charge about 24 in. long. Charges 14 in. long are used in the middle holes. Thus, the entire top bench is broken down with about 3.2 lb. of FF powder, while for an entire 40-ft.-wide cut, making about 60 tons of coal, the explosive required is 3.2 lb. of blasting powder and 1.1 lb. of permissible. In the 45- to 55-ft. angle faces, one additional hole is drilled in the top.

The use of black powder in steel shells was developed by Charles Blanchard, now superintendent for the Sixth Vein Coal Corporation, and Sterling S. Lanier, Jr., now president of the Norton Coal Corporation. First application was in 1927 and the idea was patented in 1928. Use of the shells was discontinued in 1930 when the downward trend of wages made mechanical operation unprofitable. With the return to mechanized operation at Crabtree in 1938, the output of 1¼-in. screenings jumped about 5 percentage points, and, as coarse coal was at a premium at this operation, it was decided to return to shell shooting, which cut screenings output 8 percentage points, or even below hand-loading results. A stable local outlet for all the screenings made at the Nortonville No. 1 mine resulted in a decision to continue conventional shooting methods at this operation for a time, although it is planned to start the use of shells—at least in times of good coarse-coal demand—at an early date.

The powder shells are made of special steel tubing and are designed to eliminate flying as far as possible. Shell size is such that they will fit a drillhole about 2¼ to 2½ in. in diameter, and the length may be varied to accommodate various sizes of charges. Standard No. 6 electric blasting caps are placed in the shells before they are filled with powder, and the shells are tamped in the holes in the usual manner. However, a shell has been developed with threads to permit screwing it in the hole with the drill thread bar and thus eliminate stemming. This shell is designed so that it projects out of the hole and can be charged after it is in place.

The theory behind the use of a shell as a black-powder container is that the shell itself, rather than the coal, takes the initial shock of the explosion and then releases gas at high pressure to exert a slow, heaving action on the coal, decreasing shattering and checking and consequently boosting coarse-coal output. Furthermore, confining the powder in a shell makes it possible for it to burn more completely before the gases have a chance to spread and crack the coal. Consequently, a sharp reduction in smoke could be expected, which has proved out in practice.

Methods of controlling the production of flame from black blasting powder also are under investigation by Mr. Lanier with the idea of making blasting powder as safe as other explosives in the presence of gas or coal dust. Gallery tests with one proposed method have shown that neither acetylene gas nor coal dust, or the two together, could be ignited, whereas explosions occurred under identical conditions when the flame-control medium was omitted.

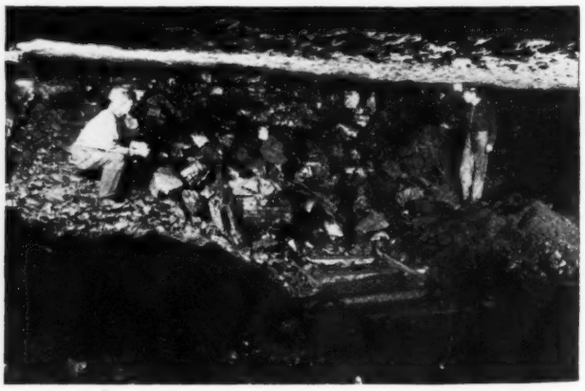
Explosive economy is another feature cited for the shells. At Crabtree, as an example, about 250 tons of coal (30 holes with charges of varying sizes in both rooms and entries) are shot with one keg (25 lb.) of FF powder. And more specifically, about eight sticks of 1¼x8-in. pellet powder formerly was used in shooting the top bench in a 40-ft. place, as compared with 3.2 lb. of FF in shells. In other No. 11-seam mines of the company, the production when using straight FF powder without shells has averaged 75 tons per keg over a period of years.

Mule changing is the rule at Crabtree, and room-track layout, in 40-ft. square-faced places, has undergone almost exactly the same changes as at Nortonville No. 1—and for the same reasons. Cars hold about 6,500 to 7,000 lb. of coal, and consequently are handled one at a time, the mule staying with them, as compared to manual placing at No. 1. In the 7BU section at the time this article was prepared, trips of about seven cars each were pulled into the room entry, the locomotive staying with the empty cars above the room in which loading was going on. Then, when a loaded car was brought out to the trip below the room, the locomotive would kick an empty down below the switch ready for the mule to take it back to the changing switch.

In angle faces, the general principles of room-track layout are the same: i.e., a room parting is laid in all cases and the switch at the face is moved up about every five or six cuts, the only major deviation being a change of the loading track from the center of the place to one rib to permit curving it across the face. Cars still are handled one at a time. Using the changing system described above, the average 7BU output is 100 cars per day when working in square-faced places. Maximum machine output to date has been 368 tons in seven hours.

View of an angle face at Crabtree mine, showing half the bottom bench down and the blue band cleaned out. The top bench is shot with black-powder shells after blue band removal.

Part of a fall of coal in a 40-ft.-wide place in Crabtree mine. The lump resulted from rolling out the top bench with black-powder shells after cleaning blue band and shooting lower bench.



STOCKPILE DEPLETION

+ Presages Active Bituminous Demand

As Consumers Rebuild Reserves

By G. B. GOULD
President
Fuel Engineering Co. of New York

THE RECENT bituminous suspension has brought about a localized depletion of industrial stocks of coal which will affect production and marketing for months to come. A situation also has been created which will have an important bearing upon the operation of Guffey-Act prices, if they are put into effect within the next two or three months.

While industrial reserve stocks normally represent only 10 to 12 per cent of the annual industrial consumption, their depletion and accumulation often constitute a major factor in determining the character of the market. Ordinarily the rise and fall of consumers' reserves have a stabilizing effect on production and prices. But a rapid rate of accumulation or depletion can create a market effect out of all proportion to the tonnage involved, because these movements in reserve stocks are either added to an active demand for current consumption or subtracted from the demand for subnormal requirements, and involve chiefly the smaller sizes.

Reserves Depleted Rapidly

We have just passed through a period characterized not only by rapid depletion of consumer reserves but by what amounts to a practical exhaustion of reserves in the industrial area east of Indiana coincident with an increase in reserves in the Middle West up to May 4. None of the protracted strikes of years ago produced just this situation. In attempting to estimate the effect upon demand and production over the next few months, it is necessary to distinguish between previous periods of exhausted reserves and the one that which now faces the industry.

At the end of the five-month strike in 1922, for example, total consumer reserve stocks were at a level which probably was below the present level for the whole country. But the depletion was pretty well distributed over the whole industrial area. During that suspension, non-union production exceeded the present output of the Midwestern districts by about 8,000,000 tons a month, and, moreover, could be widely distributed in normal channels of distribution.

Appalachian Stocks Hit

The recent suspension, though short in comparison with that of 1922, has depleted reserves almost exclusively in the consuming areas dependent upon the Appalachian fields. Continuing production in the Middle West has had little effect in slowing down the rate of reserve depletion in the East, because the Middle Western consumers had the first call on this coal to reinforce their own reserves and because it can be moved eastward only at very high freight rates.

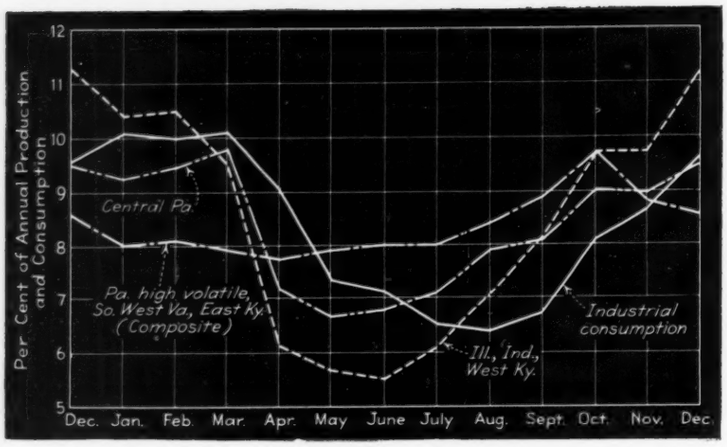
Reserves the country over, at the beginning of the 1939 suspension, were less than half of those with which consumers entered the 1922 strike period. As late as May 5, official estimates were given out in Washington, according to the newspapers, that reserves were still good for 26 days. Nothing could be more misleading. The rate of consumption in the Eastern area, with almost no outside source of fuel, indicates a depletion of consumer reserves in this section which certainly must have amounted to 20,000,000 tons by the middle of May. This means that over this great industrial area, industrial consumers' reserves are at as low a point as, if not lower than, they were at the end of the five-month suspension in 1922.

All this 20,000,000 tons will not necessarily be put back into storage by the end of the year, but it seems safe to assume that 15,000,000 tons will have to be added to consumers' reserves by that time to restore them to a normal working basis. In addition, lake shipments are now at least 5,000,000 tons behind where they would have been at this time. Presumably this deficiency will have to be made good before December.

15,000,000 Tons Needed

Some 11,000,000 tons was in cars en route or unbilled at the mines on April 1, and it has been suggested that this may be considered as an addition to reserve stocks. While the delivery of this coal does extend the time of actual exhaustion of fuel supplies, a considerable part of this amount of new production must again be in transit before coal reaches consumers in substantial quantities. Therefore, it seems conservative to estimate that 15,000,000 tons above the amount required for current consumption must be produced by the Appalachian area before the end of this year.

In order to appraise the effect of this extra demand upon production over the remainder of 1939 it is necessary to examine the normal seasonal trend of production in the more important producing districts in this area. Fig. 1 represents an attempt to establish the normal seasonal variation, expressed as per cent of annual production per month for (1) central Pennsylvania, (2) western Pennsylvania, southern West



Seasonal trend—bituminous coal production and industrial consumption (based on the five years 1932-34 and 1936-37).

Virginia, and eastern Kentucky; (3) Illinois, Indiana and western Kentucky. For reference, there also is a curve showing the estimated trend of industrial consumption, derived from a study of consumption in a group of industrial plants, which represents a fair cross-section of general industry except the steel mills.

Central Pennsylvania production trends more nearly coincide with industrial consumption because domestic consumption plays a comparatively small part in demand for coal from this district. The relation of the two curves—production and consumption—reflects the normal tendency of consumers to buy less than they use during the spring and early summer months, thus depleting reserves during this period, and to buy more than they use during the fall and early winter. In a year of normal consumption, central Pennsylvania production from April 1 to Oct. 1 will average about 800,000 tons a month below the average during the six cold months. By operating at the winter rate of production, this amount of coal is available for addition to consumer reserve stocks up to Oct. or Nov. 1. In other words, 4,000,000 to 5,000,000 tons can be added to consumer reserves from this district before next winter without extending production above the ordinary winter rate.

Lake Shipments Help

The curve for western Pennsylvania, southern West Virginia and eastern Kentucky, however, shows quite a different normal seasonal characteristic. Summer decline in consumption is compensated for by the shipments to the lakes, resulting in a flatter curve the year round, with a peak in October, when there is an overlap of lake shipments and rising industrial demand. The average winter rate of production for this area is only slightly above that for the summer, but, due to the large total production, there would appear to be available about 1,000,000 tons a month for addition to consumers' reserves without pushing output above a normal winter rate. This accounts for another 4,000,000 to 5,000,000 tons available within ordinary operating schedules.

Since 1932 there have been four periods of reserve accumulation. In the spring of 1935 and in the fall of 1938 the monthly average rate of accumulation was about 2,000,000 tons. In 1933, when industrial consumption was at a very low point, reserves rose for three months at an average rate of 2,800,000 per month. In 1936, reserves began to rise sharply in July, averaging about 2,000,000 a month to January, and then at a still faster rate to April, the average increase for the nine months being 2,500,000 tons a month. If it be assumed that 70 per cent of the reserves are in the areas supplied by the Appalachian region, the rate of increase during this period was 1,750,000 tons a month. This period coincides with the highest sustained rate of bituminous output for any period of equal length in recent years.

There thus appears to be easily available from the entire area affected by the suspension about 10,000,000 tons for consumer reserves before next winter, but only by the elimination of the normal summer let-down in production. Even allowing for a generous margin of error in the estimate of the depletion of reserves and the amount required to restore them to a normal working level, there is in prospect a more active demand through the summer than has been experienced in many years.

The rise and fall of industrial reserve stocks chiefly affect the demand for the slack sizes, and this, of course, accentuates the effect upon the market. The recent suspension has not created anything like the same deficiency in domestic sizes, while the early part of the process of restoration of industrial stocks coincides with the period of minimum demand for lump and egg. The combined effect of larger total demand with an unusually unbalanced demand as to sizes presages a market condition unlike anything that has been seen since the early '20s.

In the Middle West, however, the underlying market conditions will be just the reverse of those in the East. Industrial reserves in the West on May 1 undoubtedly were above normal for this season. Normally, the curve for the Midwestern area (Fig. 1) shows a greater seasonal variation than for any of the other districts, reflecting the greater influence of domestic demand, and no compensating summer demand, such as lake shipments furnish to Pennsylvania, West Virginia and eastern Kentucky. A greater-than-normal decline in demand this summer may occur in the Middle West.

Price Control Favored

This market situation has an interesting bearing upon the control of prices under the Guffey Act. When price control was tried in December, 1937, industrial reserves had been built up to a relatively high point in anticipation of higher prices; demand for the smaller sizes, therefore, was reduced, as consumers drew upon these reserves just at the time when demand for domestic sizes was at its peak. The result, of course, was great difficulty in selling enough slack at fixed prices to balance the domestic demand.

This year, if the prices are finally put into effect again by July, industrial reserves will be relatively low, and slack sizes undoubtedly will be in good demand at a time when it will be difficult to move enough of the larger sizes, at fixed prices, to balance. The larger sizes, of course, always can be crushed, and no doubt will be, if slack prices are high enough to justify it. The underlying market conditions, therefore, will this time be favorable to an appearance at least of workability for the system of rigid price fixing. Whatever basic economic weaknesses there may be in the plan probably will be obscured, or completely concealed, for some months—quite possibly until the spring of 1940.

FIRST OF A SERIES OF ARTICLES ON COAL-RESEARCH ACTIVITIES

COAL RESEARCH

+ At Battelle Memorial Institute

By RALPH A. SHERMAN
Supervisor, Fuels Division
Battelle Memorial Institute

The bituminous coal industry has been frequently, and undoubtedly correctly, charged with a lack of appreciation of the service that research can render it in increasing the value of its product, in broadening its markets, and in giving it an opportunity for profit. Various institutions for research, and particularly Bituminous Coal Research, Inc., at Battelle, have demonstrated that research is not some glamorous, mysterious thing that is difficult to understand. This proof that research, whether of the so-called fundamental or engineering type, is a practical servant that pays its own way and more has gone far to awaken the industry.

IN the will which endowed Battelle Memorial Institute at Columbus, Ohio, as an organization for industrial research, coal was mentioned specifically as one field of endeavor, for both Gordon Battelle, the founder, and Col. John Gordon Battelle, his father, had been intimately concerned with coal mining and utilization. Accordingly, coal research has occupied an important place in the activities of the institute since work began in 1929.

With the funds provided by the will and with those later bequeathed by the founder's mother, Annie Norton Battelle, the trustees have set up the best of facilities in buildings, equipment and organization for research in the preparation, processing and combustion of coal. In two general classes of research, (1) that supported by Battelle from its endowment, and (2) that paid for by industry at cost, a growing staff of research engineers has advanced the frontiers of the knowledge of coal.

One example of the research in combustion, carbonization and preparation of coal supported by the endowment to provide fundamental information of general interest to industry was the extended investigation of the burning characteristics of pulverized coals and radiation from their flames. Complete equipment for drying, pulverizing and feeding coal into a specially designed combustion chamber was installed in a large three-story laboratory. The results of this project, published in several technical papers, have been of value to users in the selection of coals for burning in pulverized form both in boilers and in metallurgical furnaces and have aided in the design of combustion equipment.

Other institutions engaged in research on the fundamentals of the combustion of pulverized coal have made use of the data obtained at Battelle, and the equipment and methods developed in the research have been used for industrial sponsors. These have included producers who wished to determine the burning characteristics of coals from their various mines and manufacturers of mills and burners. For example, the equipment and staff proved for a private sponsor who was using gas or oil as a fuel the possibility of the combustion of pulverized coal in alloy-steel radiant tubes used for heat-treating, annealing and enameling.

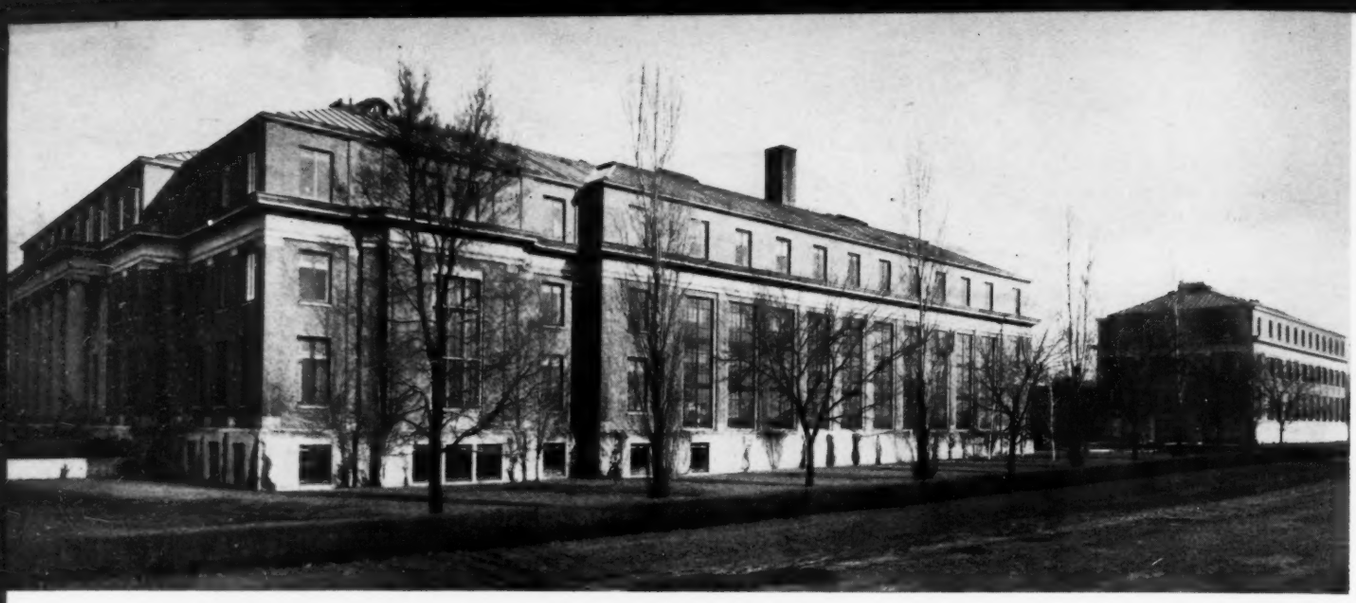
Sponsored Research Valuable

The value of the Battelle plan of sponsored research has been well exemplified in the series of investigations conducted for Bituminous Coal Research, Inc. Without the necessity of spending its limited funds on plant and equipment, this new venture in coal research was able to obtain the maximum return for the money available. The laboratory on the fourth floor of the main building, which is devoted principally to coal-burning equipment such as domestic and small industrial stokers, boilers and furnaces, was the center of the research on the characteristics of coals for residential stokers. Designed for flexibility, the equipment for measurement of temperatures, pressures, density of smoke, and analysis of flue gases can be shifted readily from one to the other of the several stoker-furnace combinations that may be set up at one time.

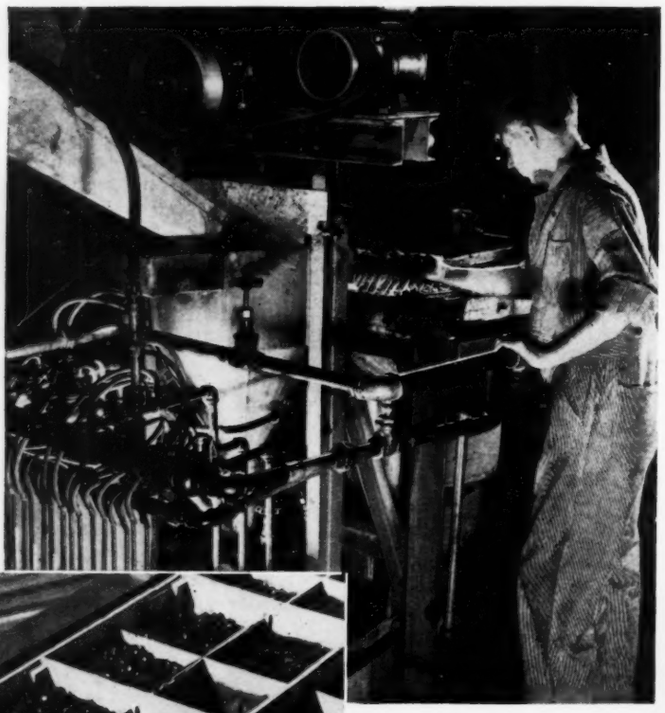
Research Goes Into the Field

Fuels research also is carried into the field, as in a survey of the costs and efficiencies of various fuels used for domestic heating, one on the use of coals in industrial stokers, and another on the relation of the characteristics of coals to their use in pulverized firing. A field investigation is now under way to determine the relation of combustion volume to smoke emission from bituminous coal fired by underfeed stokers. This research is sponsored by the Stoker Manufacturers' Association, Institute of Boiler and Radiator Manufacturers, National Coal Association, and the Steel Heating Boiler Institute.

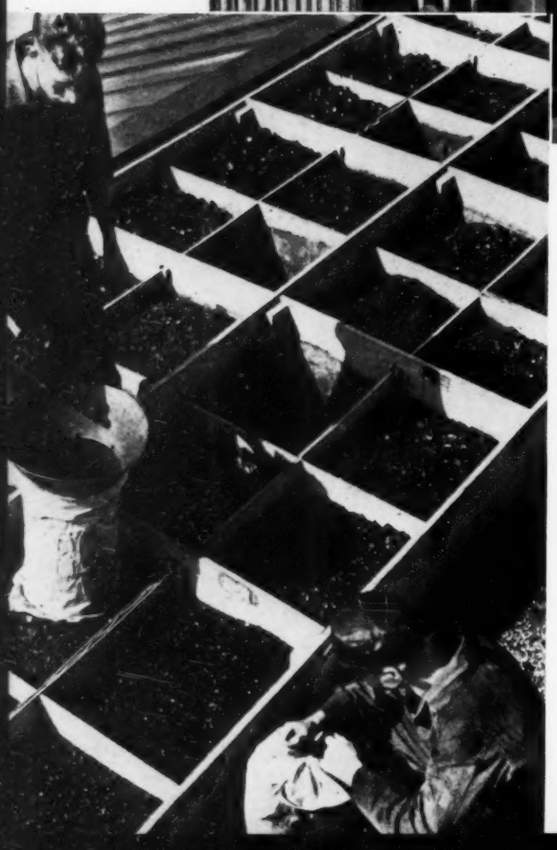
Another illustration of the cooperation of Battelle with industry was its support of an investigation of the fundamentals of combustion in small underfeed stokers. This research was closely related to one sponsored by Bituminous Coal Research, Inc., and the results were made available to that organization for publication. Information on the



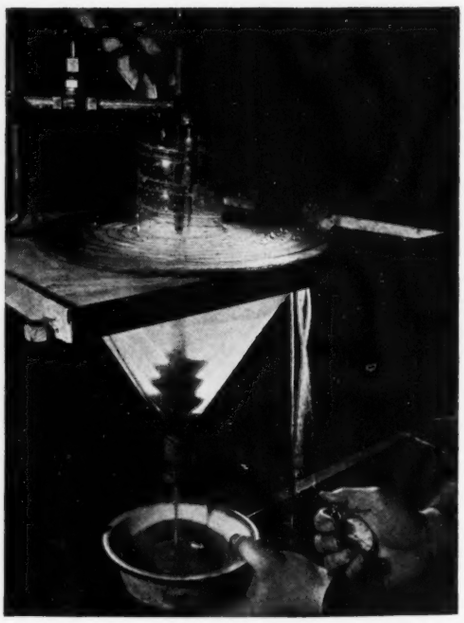
Battelle Memorial Institute as seen from the northwest. The main building was built and occupied in 1929. The structure at the right, which houses the coal-preparation and ore-dressing laboratory and an experimental foundry, was completed in 1937.



Above—Cleaning coal on the small Chance cone.

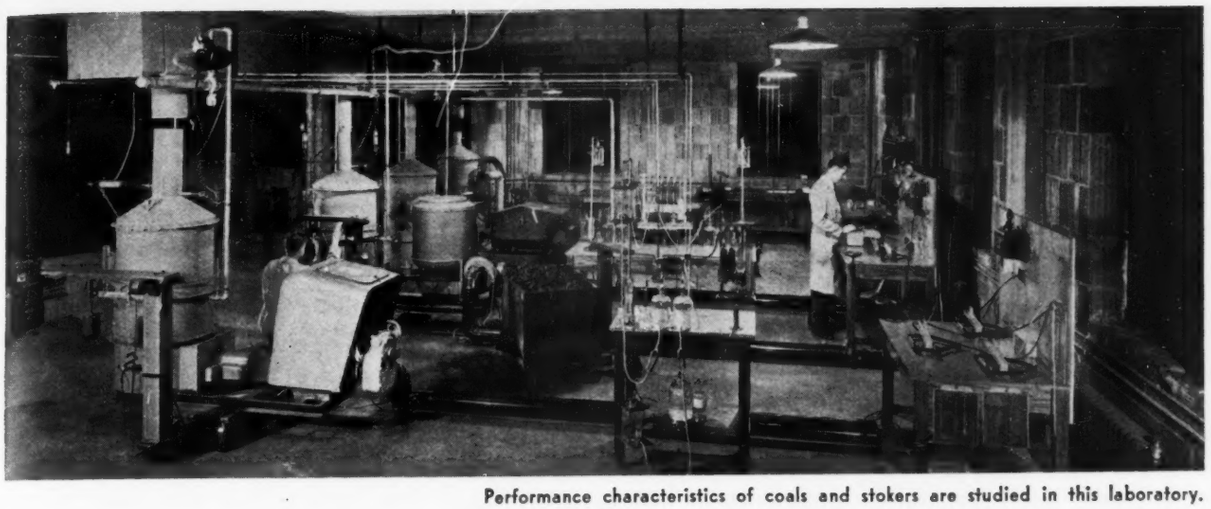


Left—Coal samples are exposed to the weather to test the stamina of dustproofing agents.



Right — The Battelle settling cone was developed from celluloid models. The solids flow out from the bottom; the clear water flows from the top of the spirals.

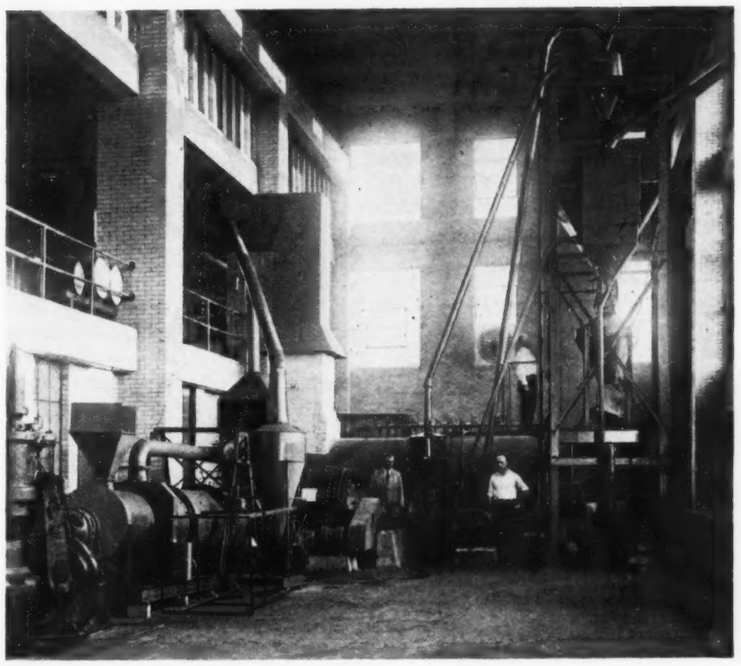
• In increasing numbers, producers, producer associations and manufacturers of equipment for the preparation and utilization of coal are bringing their problems of stoker coals, of ash clinkering and slagging, of dustless treatment, of coal cleaning, of stoker design, of coal-burning equipment for metallurgical furnaces, of briquetting and of carbonization to Battelle. Here they avail themselves of the best of equipment and a trained staff at cost, for Battelle is a non-profit organization. All discoveries and patents are



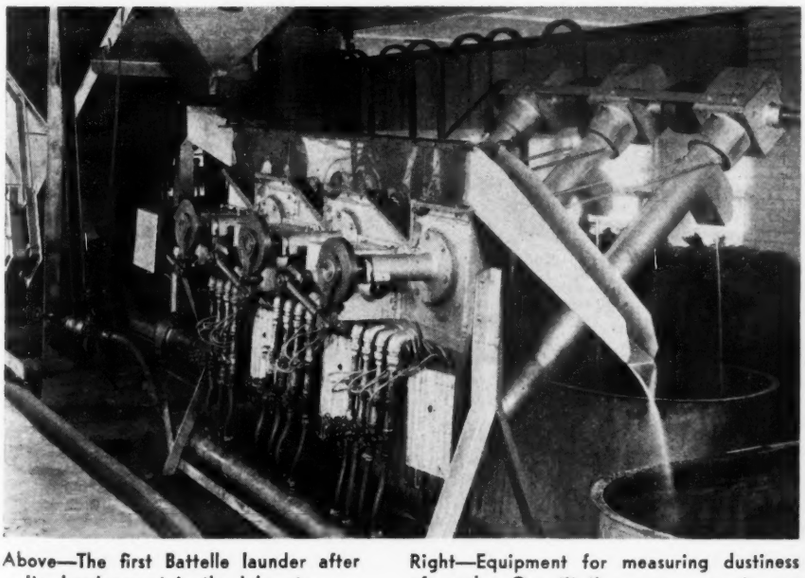
Performance characteristics of coals and stokers are studied in this laboratory.

wholly the property of the company or group that supports the research. All information likewise is wholly theirs unless they wish to make it the basis of a published paper.

Gordon Battelle's vision probably has been more than fulfilled in the decade of the institute's operations. But the opportunity for service grows at an accelerating pace as coal and its allied industries make greater use of the facilities that he so generously provided for the solution of their problems.



How pulverized coal burns is determined in this equipment.



Above—The first Battelle launder after its development in the laboratory.

Right—Equipment for measuring dustiness of coal. Quantitative measurements are made of both coarse and float dusts. A part of the combustion laboratory is seen in the background.

events occurring in the fuel bed of a stoker that probably would have never been obtained by an individual manufacturer was made available to the entire industry. Its application undoubtedly will result in improved stokers for bituminous coal.

Still another group attack on a problem of common interest was that of the dustless treatment of coal with oil by coal producers, oil refiners, and spray-equipment manufacturers, represented by Bituminous Coal Research, Inc.; Standard Oil Co. of New Jersey, Sun Oil Co., and Viking Manufacturing Co. In two years of research, the relation between the characteristics of oils and those of coals that are important to the preparation of satisfactorily dustless coal was determined and made available in publications to the entire industry. A brief non-technical booklet giving the highlights of the results in the form of a "Quiz Book" will soon be off the press.

Coal Cleaning Studied

Coal - cleaning problems are attacked by the coal-preparation division of Battelle in a thoroughly equipped laboratory that occupies the entire third floor of a four-story building, 50x150 ft. in plan dimensions, completed in 1937. Float-and-sink equipment, tables, jigs, launders, flotation machines and classifiers are available for the study of the possibilities of cleaning a particular coal and cleaning can be done on a pilot-plant scale.

This laboratory serves not only the coal producers for the solution of their cleaning problems but equipment manufacturers as well. Improved air tables and jigs have come from this division. A feature of interest to all preparation men is the original machine which resulted in the development of a new type of launder now installed in several preparation plants as the Koppers-Battelle launder. A settling cone developed at Battelle has an internal spiral contraction which gives it an exceptionally high capacity.

Processing of coal by briquetting and by carbonization, and the production of chemicals from coal have had attention both as Battelle and as privately sponsored projects. A thorough study of the possibilities for greater markets for coal through research in the gasification of coal was completed recently in cooperation with Bituminous Coal Research, Inc. Results of this study will be published in the near future. In the two-story laboratory on the ground floor of the new building of the Battelle plant is the experimental foundry. Equipment includes an experimental cupola designed for the study of the relation of the properties of foundry cokes to their economy and the quality of the iron melted.

In the analytical laboratory that serves all divisions of the institute is equipment for proximate and ultimate analyses, calorific value, and fusibility of ash of coals. These services are available in connection with any research project, but, of course, no commercial testing is done. The physics department cares for calibration of thermocouples, pyrometers and other physical equipment and consults on problems of heat flow, fluid flow, and special problems of temperature measurement. A photographic department well equipped with cameras and dark rooms insures that reports of research will be well illustrated. Carpenter and machine shops furnish facilities for the construction of equipment not standard or available on the market.

Similarly, each division is a service department for every other division. The chemistry divisions advise the fuels group on chemical aspects of combustion or carbonization and the metallurgists and ceramists supply information on the properties of materials of construction. At one end of the imposing entrance lobby of the main building is the library the beauty and comfort of which invite the research worker to avail himself of the 7,500 volumes and current periodicals with which the shelves are stocked. At the opposite end of the lobby is an auditorium for weekly meetings of the technical staff and for meetings of the local sections of various technical societies.

Twelve Research Divisions

The value to industry of the type of research conducted at Battelle is demonstrated by the growth of the physical facilities and of the staff. The latter now numbers 165, of whom approximately 100 are research engineers and technical assistants. Although the growth of Battelle may be partly attributed to the splendid physical equipment for research which the trustees have made available, more credit undoubtedly is due to the staff and its organization. Under the director are twelve supervisors of research divisions: fuels, chemistry, coal preparation and ore dressing, ferrous foundry and process metallurgy, steel manufacture, non-ferrous metallurgy, physical metallurgy, electro-metallurgy and hydro-metallurgy, physics, ceramics, inorganic chemistry, and organic chemistry.

After assignment to a problem, the research worker or group at Battelle does not withdraw into a cloister to work alone on its solution. Few problems concern but one division; the fuel engineer needs the counsel of the metallurgist, the physicist, the chemist, and the ceramist, and they, in turn, must frequently have advice in fuels. Although many problems are of a confidential nature and this confidence is maintained, the direction of the division supervisor and the consulting services of other divisions are always available.

Contact with fellow workers in other institutions and in industry is maintained by staff members through activities in technical societies and Battelle is glad to carry a heavy load of committee work for these societies. In this way and in his close association with sponsors, the research engineer keeps in touch with the practice and problems of industry. Through talks before societies and trade associations, the writing of books, articles in the technical press and a growing list of handbooks and other reference works, the results of Battelle research are laid before industry.

Training a Necessary Activity

The training of men for research on its own staff, in other institutions, and in industry is considered by Battelle to be one of its logical functions and many "alumni" are at work at other places. One of the ways in which the educational function is carried out is through the maintenance of three fellowships at near-by Ohio State University. The fellows do the course work required and obtain their advanced degree through research at Battelle on some fundamental problem under the joint direction of a professor from the university and a supervisor from the institute.

Battelle also provides for a number of research associates each year. The salary and expense for supplies and equipment may be paid wholly from Battelle funds or jointly by Battelle and an industrial organization. The associate usually works on some fundamental problem of general interest the results of which are published. The training in research that recent graduates thus receive under the institute's supervision enables them to be of greater service to the employer to whom they go at the end of a training period of one or two years.

PRESCRIPTION-COAL PLANT

+ Prepares "Utah King Coal" for Market

In U. S. Fuel Modernization Program

• "Prescription coal" is a term being heard more and more frequently with advances in preparation-plant design. One of the latest of the prescription-type plants is that of the United States Fuel Co., Hiawatha, Utah, the home of "Utah King Coal." Built to replace two old tipples and designed for two-shift operation, the new King plant includes a washer for all coal under 5-in. in size, mechanical and heat-drying equipment and a complete rescreening and blending plant including screens, storage bins, proportioning feeders and a blending conveyor. Tramp-iron removal and dustless treatment, among other things, were not neglected in the attempt to make the new plant meet every specification for modern bituminous preparation.

LIVING up to its designation as a "coal prescription counter," the new mechanical preparation plant of the United States Fuel Co. at Hiawatha, Utah, includes provisions for accomplishing every operation now accepted as desirable in coal cleaning, sizing, dewatering and drying, mixing and blending, tramp-iron removal and dustless treatment. Built largely within the shell of old King No. 1 tipple, with additions as required to meet the new preparation standards for "Utah King Coal," the present plant is one outgrowth of a general program of modernization work and consolidation of operations of King Nos. 1 and 2 mines including a change from part to full mechanical loading. As a result of the consolidation, the one preparation plant, which is the subject of this article, will serve not only the original Nos. 1 and 2 operations but also the West Hiawatha workings, inactive for several years. All the coal from these several properties, as detailed in the May issue, p. 29, will come to the present King No. 1 opening, and the combined workings have been rechristened King Mine.

One Plant Succeeds Two

Until the summer of 1938, when work was started on the new plant, King Nos. 1 and 2 mines were served by separate screening and hand-picking tipples. The old King No. 1 tipple, succeeded by the new plant serving all the mines, was a six-track structure making four primary sizes: 8-in. lump, 3x8-in. stove, 1⅝x3-in. nut and 1⅝-in. screenings. A rescreening plant permitted separating the latter size in 1x1⅝-in. pea, 1-in. slack, 3/16x1-in. stoker and 3/16-in. slack. A mixing conveyor was available, with other facilities, for making 3-in. mine-run, 8-in. mine-run, 3-in. lump, 1⅝-in. lump, etc. Crushing equipment was installed for breaking down the larger sizes when desired.

No cleaning of any kind was done on coal under 1⅝-in., while the larger sizes, as noted above, were hand-picked to try to remove the several types of foreign matter, principally material from a persistent shale parting; top material, particularly where the usual sandstone is replaced by shale; boney compounds; sandstone spars in the seam, etc. From the standpoint of mechanical cleaning, boney and flat pieces of shale offered the greatest problem, the boney because its gravity does not differ greatly from the washing gravity and the flat shale not only because of its shape but also because of its variation from pure shale through bituminous to boney. Under the old preparation system, nothing could be done to remove impurities from the finer sizes once the coal was in the mine car, although operation on a partly hand-mining basis afforded some opportunity for cleaning while loading. Where the coal was machine-loaded, however, such cleaning could not be done without stopping production, and consequently machines, as far as possible, were kept in cleaner coal, even though this meant skipping some sections, etc., with consequent disruption of projections, leaving of pillars for future recovery and other drawbacks to orderly development.

Mechanical Cleaning Chosen

Even with the above measures, however, the quality of the shipped product was subject to considerable variation, which would be increased with full mechanical loading unless efficiency in loading were sacrificed to attempts at cleaning at the face. Consequently, mechanical cleaning was desirable not only from the standpoint of improvement in the shipped product, including maximum uniformity in chemical and physical characteristics, but also from the standpoint of efficient operation underground on a 100-per-cent mechanical basis. Therefore, the new plant, designed and built by the McNally-Pittsburg Manufacturing Corporation, and shipping the same list of sizes as the old (except that market conditions recently have made it necessary to produce 3x10-in. instead of 3x8-in.), was equipped with a washer for all coal under 5-in. Sizes larger than 5-in. are hand-picked on shaking tables equipped with combination lighting units comprising both mercury-vapor and incandescent bulbs. Provision is made for increasing recovery by crushing and re-treating boney material from the

picking tables and also part of the washer reject. A screen-type heat dryer is installed for drying 1⅝x3/16-in. coal, with centrifugal dryers for all material smaller than 3/16-in.

A major feature of the new operation is a complete rescreening and blending plant for the production of 1⅝x1-, 1x3/16- and minus 3/16-in. sizes, with provisions for crushing the 1⅝x1-in. pea when desired. The blending plant includes storage bins for all three sizes, with proportioning feeders for recombining them in any desired percentages in making "prescription" screenings and stokers. The sizes made in the blending plant may be returned to the main plant for combination with the larger sizes in making mine-runs. Tramp iron is taken care of by a magnetic pulley for the raw feed to the plant and chute-type magnets ahead of a prepared-coal crusher and in the blending plant. Box-car loaders are installed for lump, egg and stove. All sizes can be treated with either wax or oil for rendering them dust-proof. A dust-collecting system to serve the entire plant is under construction.

Capacity of the new plant is 300 tons per hour, or 2,100 tons per shift of seven hours. In fact, the entire mining, transportation and preparation cycle is geared to that average output. Also, both the mine and preparation plant are operated two shifts. The mine-run screens, picking tables, washer and head tank, washed-coal classifying screen, fine-coal dewatering screen and the drying equipment (heat and centrifugal), as well as the necessary auxiliary equipment, were placed in the shell of the old tipple, while the blending plant was housed in a new structure. New stokers were installed under the heating boilers and, while the old trestle and dumping arrangements were not disturbed, the car haul was equipped for remote control from the car-coupling station, rather than separate control from another location.

A rotary dump turns the cars over to discharge the coal into a 15-ton hopper at the new King plant. Because of the thickness of the seam and the nature of the coal, lumps weighing a ton or more frequently come into the plant and consequently crushing to reduce the size of these lumps is necessary. This is done in a McNally-Pittsburg 30x72-in. double-roll crusher, which is adjust-

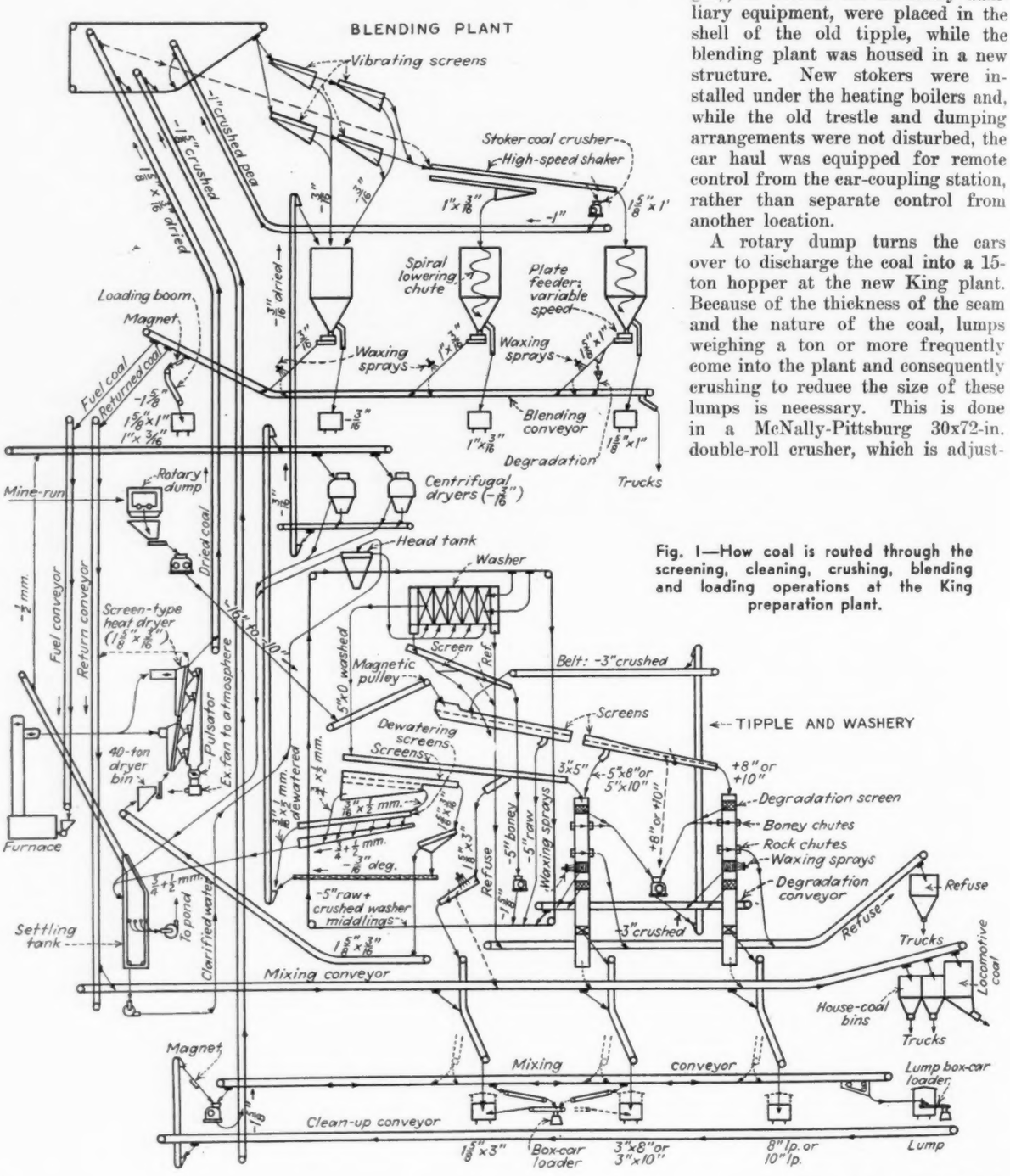


Fig. 1—How coal is routed through the screening, cleaning, crushing, blending and loading operations at the King preparation plant.

able to break to a manixum size of 16 down to 10 in. Mine-run is fed out of the receiving hopper into the crusher by a plate feeder driven through spur gears to an adjustable-throw crank. A three-speed motor also is used, this motor, plus the adjustable throw allowing a wide latitude in feeding rates to fit coal quality and production schedules.

Mine-run, after passing through the crusher, goes onto a 72-in.-wide belt which discharges the coal over a Stearns magnetic pulley for removing tramp iron onto a pair of 7-ft.-wide shaking screens. These screens (bar-type hangers, balanced-crank drive, 6-in. throw) separate the mine-run into plus 8-in. (or 10-in.), 5x8-in. (or 5x10-in.) and minus 5-in. fractions. The two larger sizes each go to a 5-ft.-wide shaking picking table supported from below on ash boards, first passing over degradation sections. Material through these degradation sections goes to a lump-coal crusher, which also receives boney pickings from both tables. When lump coal is to be crushed, a gate is opened in the lower shaking screen, allowing this size to drop into the crushing unit—36x36-in. Jeffrey single-roll—adjustable to break to a maximum size ranging from 10 in. down to 3 in. Crushed lump, degradation and boney material are discharged into a bucket elevator, which feeds onto a 36-in. belt conveyor leading back to the head of the main shakers.

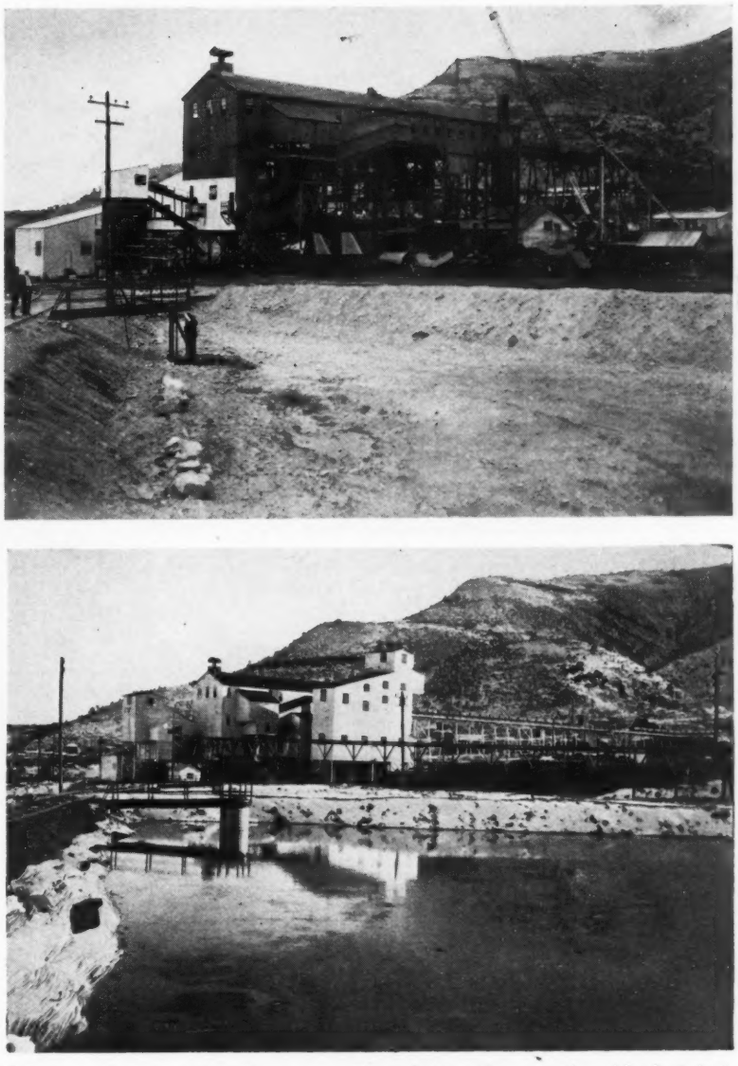
Combination Lights Used

The lump table is equipped with one Westinghouse combination lighting unit (mercury-vapor bulb and three 100-watt incandescent bulbs). Two such units are used over the egg table. All three units replaced straight mercury-vapor lamps—now installed, with one additional such lamp, in other parts of the plant, notably at the dumping station—inasmuch as experience showed that combination lighting was better for picking under King conditions. In addition to the boney material noted above, pure refuse also is removed on the picking tables, going directly to the refuse conveyor. Picked coal passes through special wax-treating hoods, featured by steam grids to prevent smearing of the wax, as will be detailed hereinafter, and then goes over degradation screens to the loading booms or mixing conveyors. Degradation through the grids in the treating boxes and through the screen sections which follow is conveyed to the washer-feed conveyor.

Minus 5-in. coal from the mine-run screens, which also includes, of course, a certain proportion or all of the crushed lump, boney and degradation, is carried up to the washing unit by a 42x20-in. gravity-discharge elevating conveyor (22-ft. lift). This conveyor discharges into launders fitted with vanes for shutting off the air to the washing compartments in case the coal flow stops, thus preserving the washing bed. The launders also are equipped with liner plates to resist abrasion.

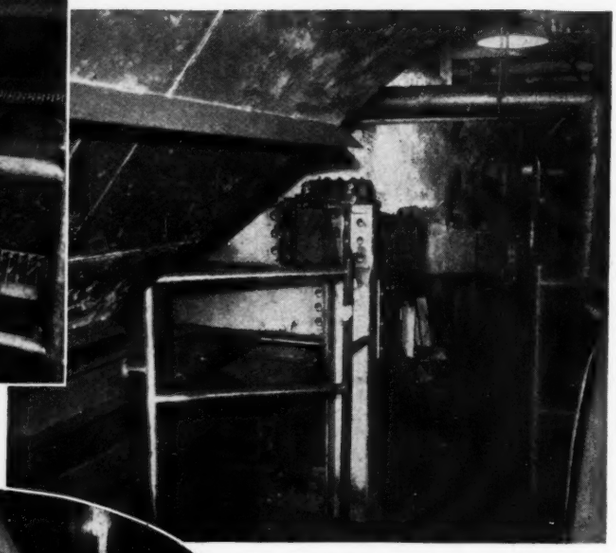
Refuse is taken out of the 5x0-in. coal in a five-compartment McNally-Norton washer with automatic reject controls. This washing unit, with a capacity of 250 tons per hour, is the first of the McNally-Pittsburg "Streamlined" units, in which, among other things, the air receiver is located below the washing floor rather than above. Air is supplied by an Ingersoll-Rand blower, and the wash box has been equipped with a "chip arrester" to keep wood out of the finished product.

Reject from the No. 1 elevator at the feed end of the washer, being primarily pure, heavy material, goes directly to the refuse conveyor. Reject from the No. 2 elevator goes onto a shaking screen fitted with small perforations for removing the fines, which are largely impurities passing through the screen plates in the washer. This through product goes directly to the refuse conveyor. The over product from this screen, depending on the washer operator's judgment of its character, goes through a gate to the refuse conveyor or over the gate to a 24x24-in. McNally-Pittsburg crusher. In the crusher it is reduced to about minus $1\frac{5}{8}$ in. and returned to the washer feed. Final refuse from both the washer and the picking tables is



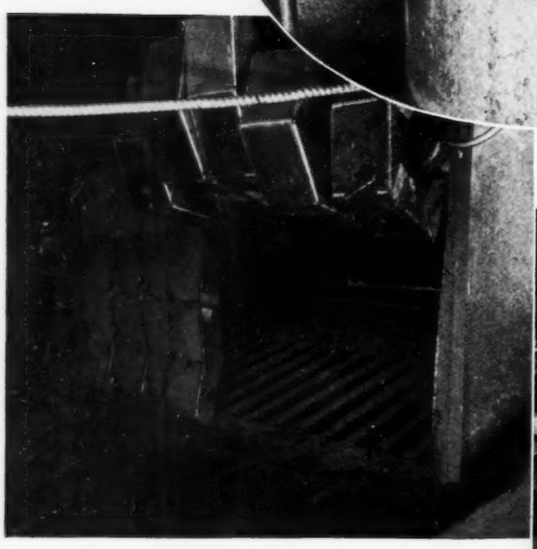
Before and after at the King preparation plant. Above is the old plant just prior to its face-lifting operation. Below is the reconstructed plant with the new blending plant out in front.

This five-compartment washing unit has been "streamlined" by placing the air receiver below the washing floor.



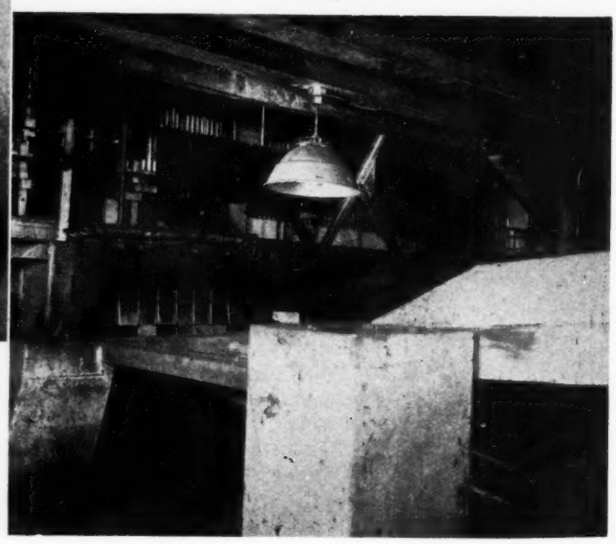
Looking down along the screen-type heat dryer for 3/16 x 1⅝-in. coal.

Two centrifugal dryers dewater minus 3/16-in. washed coal at the King preparation plant.



Showing grate bars under the waxing hood on the lump table in the King preparation plant. Underneath each bar is a steam line. The sectionalized metal curtains, part of which have been raised for photographic purposes, prevent escape of the vaporized treating fluid.

Combination mercury-vapor and incandescent lamps are used over the shaking picking tables. At the left is the lump waxing hood.



conveyed to a 20-ton bin equipped with undercut gate for loading motor trucks.

Washed coal flows through launders also fitted with SAE-1045 liner plates to a pair of 6-ft.-wide classifying screens supported on flexible wood hangers. These screens separate the coal into 3x5-, 1⅝x3-, 3/16 x1⅝- and minus 3/16-in. sizes. The latter size is passed over stainless-steel wedge wire for removing fines and water and then goes to a high-speed dewatering screen (¾- and ½-mm. wedge wire). The 3x5-in. size passes to the lower end of the stove picking table to join with the 5x8- or 5x10-in. hand-picked coal to make 3x8- or 3x10-in. stove.

Various Routings Available

Nut (1⅝x3 in.) from the classifying screen is discharged onto a loading boom for loading or mixing. Routing of the lump and stove is arranged so that these sizes can go into the primary mixing conveyor before they go on the booms. This primary mixing conveyor also receives coal from the blending plant and can be used to carry lump, stove or engine coal to the bins at one end. The booms may be raised to discharge into an auxiliary mixing conveyor for transportation to either or both of the two Manierre box-car loaders, or, in the opposite direction, to an elevator to a Jeffrey 36x48 in. "Flextooth" crusher for breaking down lump, stove or nut to minus 1⅝-in., which is conveyed to the blending plant. Grate bars are installed to eliminate oversize. This crusher is preceded by a chute-type tramp-iron magnet.

Washed 1⅝x3/16-in. coal from the classifying screens is passed over a "Selectro" vibrating dewatering screen to remove any material smaller than 3/16 in. Coal over the "Selectro" units is discharged onto an elevating conveyor leading up to a 40-ton surge bin ahead of a McNally-Pittsburg Vissac screen-type heat dryer. Minus 3/16-in. coal from the classifying screen, after passing over ¾- and ½-mm. wedge wire, flows through a launder to a high-speed shaking dewatering screen (5x24 ft., laminated-wood hangers, fitted with ¾- and ½-mm. stainless-steel wedge wire). Dewatered coal is conveyed to the Redler elevator feeding the centrifuges, while minus ¾- and ½-mm. material flows with the water to a sludge-reclamation plant.

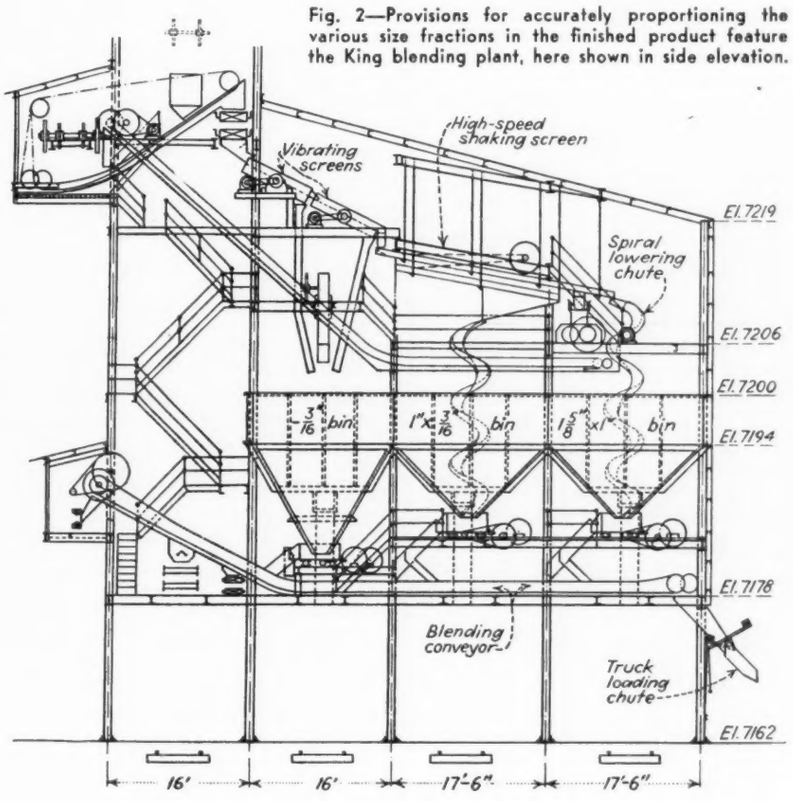
The sludge plant consists essentially of a concrete tank and a 10-f.p.m. sludge conveyor. Total tank length is 75 ft., of which 23 ft. is inclined 6⅛ in 12 in. Tank width and depth are 12 ft. Water overflowing the tank is pumped up to a conical head tank (12 ft. in diameter by 11 ft. high, providing a 16-ft. head on the washer) by a McNally-Pittsburg 10x10-in. centrifugal pump, with the head-tank overflow returning to the sludge tank, which is arranged with ports at different levels to permit bleeding out part of the contents for pumping to a storage pond (300-g.p.m. Gould centrifugal pump). Mine water is used for washing, and for this purpose a line about two miles long was brought out to 150,000-gal. storage tanks on the mountain above the preparation plant. Fresh water from these tanks is added to the washing system at a pressure of about 70 lb. per square inch through nozzles over the classifying screens. Water from the storage pond also may be used for this purpose, being forced in by a 500-g.p.m. Worthington centrifugal.

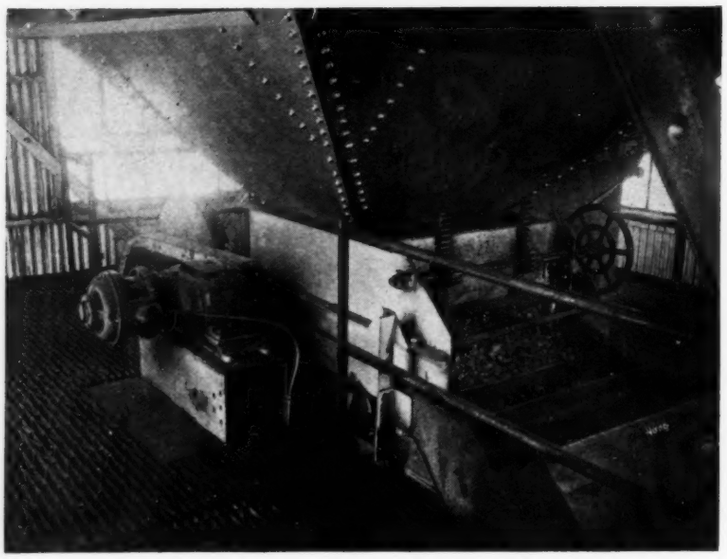
Material removed from the sludge tank is elevated by the sludge conveyor to a cross-conveyor leading to the Carpenter centrifugal dryers. These dryers—two Type AR-4 units—thus receive all minus 3/16-in. material made in the plant, which goes, after drying, to the proper bin in the blending plant.

Capacity of the Vissac dryer used for dewatering is 75 tons per hour. It is preceded by a 40-ton surge bin equipped with "Bindicators" to show when the bin is about to run dry or overflow, in which case the operator either stops the dryer or the coal flow, respectively. Coal is fed out of the bin into the dryer by a plate feeder equipped with a Link-Belt "P.I.V." gear for adjusting the feeding rate as desired. The dryer consists of two high-speed shaking screens equipped with 1-mm. stainless-steel wedge wire. Hoods over each screen are connected to ducts from a heating furnace. Heated air is pulled down through the screens by a Sirocco exhauster rated at 926 r.p.m. and 40,000 c.f.m. of 130-deg.-F. air at a 5-in. static pressure at an elevation of 7,200 ft. This fan exhausts through a rotating valve, or pulsator, which alternately opens and closes the outlet from the air chamber below the screens, the idea being to stop the down-flow of air through the screens at intervals to enable the screen motion to clean the openings and thus prevent blinding. The pulsator is equipped with a "P.I.V." gear to permit adjusting its operation to screen motion and loading. At present, the screens operate at 200 r.p.m., 1-in. throw and 2-in. total travel.

Heat for the dryer is supplied by

Fig. 2—Provisions for accurately proportioning the various size fractions in the finished product feature the King blending plant, here shown in side elevation.





Blending bins discharge into open-ended boxes equipped with adjustable gates. Underneath the boxes are plate feeders with adjustable-speed drives, which move the coal into chutes equipped with waxing hoods.

a Bigelow-Liptak furnace fired by three "Firite" stokers. The main duct to the dryer is taken out of a steel stack about 63 ft. high. Stack diameter is 8 ft. 9 in. for about 40 ft. at the bottom and 5 ft. for the remainder. Temperature of the air is adjustable, although the installation was designed for 700 deg. F. at the dryer inlets and 130 deg. at the exhaust-fan inlet. The furnace is equipped with louvers for admitting cold air as necessary for a rough adjustment of outlet temperature. Additional louvers are installed in the hot-air duct and are controlled automatically by the temperature of air leaving the dryer. A damper in one of the two branch ducts permits adjusting the flow of air to the two screens, while dampers in the main duct and in the stack just above the duct take-off permit bypassing the heated air to the outside when the dryer stops.

Stoker and screenings sizes are rescreened and blended, as indicated above, in a separate plant designed to produce, as desired, a shipped product in which any or all of the three size fractions are combined in definite percentages. The blending plant, as noted, receives coal from two or three sources in the main plant: minus 1⅝-in. crushed lump, stove or nut; 1⅝x3/16-in. heat-dried coal, and minus 3/16-in. centrifuged coal.

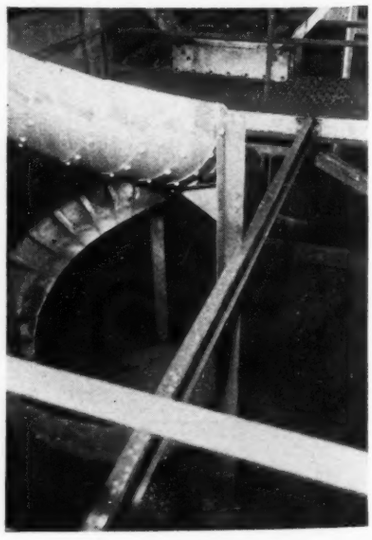
Minus 3/16-in. coal coming into the blending plant is discharged directly into a 75-ton storage bin. Crushed coal, and also heat-dried coal, if desired, is run over four 4x 8-ft. "Selectro" vibrators to remove minus 3/16-in. material, which drops into the storage bin. Plus 3/16-in. coal with a top size of 1⅝-in. flows off the vibrators onto a 6-ft.-wide high-speed shaking screen (ash boards underneath), where it is sized into 1x1⅝-in. pea and 3/16x1-in. stoker. Each of these sizes is lowered into a 75-ton bin by a spiral lowering chute. Part or all of the pea, however, can be run to a 24x24-in. single-roll McNally-Pittsburg crusher for reduction to 1-in. and recirculation to the vibrating screens. Each of the three 75-ton bins is equipped with "Bindicators" so that the blending-plant operator can tell when they are full or empty.

At the bottom of each bin is an open-topped box under which is a plate feeder driven through a "P.I.V." gear to permit wide adjustment of the feeding rate. An adjustable gate on the discharge end of each box offers a further means of controlling accurately the draw-off from each bin in making combinations, the arrangement following closely that at the No. 7 plant of the Island Creek Coal Co., Holden, W. Va. From the feeder the coal passes through waxing boxes and onto a reversible collecting conveyor which carries any size or combination of sizes either to a truck-loading chute, to a loading boom over No. 6 track, to a return conveyor to the main tipple, or to a fuel conveyor serving the drying furnace and heating boilers. A chute-type magnet is installed ahead of the loading boom for final removal of tramp iron, and the pea size is passed over a degradation screen before going into the waxing box. Each size made in the blending plant also may be loaded separately through chutes which bypass the measuring and feeding equipment.

Facilities at the King preparation plant also include equipment for waxing (or oiling) all sizes to render them dustproof. For "Waxolizing," using "Waxol" fluid, a Viking dual heating system is installed. Lump and stove are treated in hoods over the picking tables and nut in a hood over the chute to the loading boom. Pea, 3/16x1-in. and minus 3/16-in. slack are treated in the chutes following the feeders in the blending plant. All treating boxes are totally inclosed, with Viking sectionalized metal curtains at both the entrance and exit to confine the wax (or oil) vapor. To prevent the wax from congealing on the picking-table and chute surfaces and being picked up in gobs by the coal on its way through, grizzly bars are installed under the lump, stove and nut boxes, as indicated in an accompanying illustration, with steam pipes under the bars to keep the wax molten and thus allow it to flow out of the boxes. In addition, the nut box is built with double plates in the sides and top, forming chambers in which steam is introduced.

In the construction of the new plant, the tracks were not disturbed and as much existing equipment as possible was worked into the new set-up, such as motors, loading booms, car retarders (all but one of the counterweighted rewind type), box-car loaders, conveyors, etc. Location of certain existing structures, such as the house-coal bin, heating plant, etc., was not changed, and much of the original framework was utilized in the rebuilding job, which

Pea and stoker are lowered into the blending bins by spiral chutes.



included concrete floors, copper-bearing siding and roofing where required, 100 sq.ft. of wire-glass skylight over the washing floor, raising of the roof line to permit installation of the head tank in the building out of the weather, installation of steel walkways and stairs with pipe-type handrails, etc.

Twelve Sturtevant unit heaters were placed to keep the temperature in the washing and picking sections and the blending plant at 55 deg. F. or more and 70 deg. or more in the scale house. In addition to the mercury lamps noted above, general lighting is provided by steel-sash windows and incandescent lamps in porcelain reflectors. A feature of the reconstruction program was the installation of eighteen General Electric sodium lighting units in the yards and on the trestle. Each such unit, rated at 194 watts, consists of a 2 ME-1 Type M-2 "Novalux sodium luminaire" fitted with an NA-9 sodium lamp in a No. 71 flask.

Excluding the car haul, rotary dump and other units bringing coal into the operation, the King plant is operated by 79 electric motors, practically all of the ball-bearing type. Magnetic starters, are used in practically all cases. Voltage is 440, and all wiring is inclosed in conduit, with some Bx cable to certain motors. The main control station overlooks the loading booms and mixing conveyors, with supplementary stations on the washery floor (washer, heat dryer, etc.), in the boiler room and in the blending plant, plus a pushbutton station for the car haul.

A wide variety of drives are employed, with V-belts and spur gears the most numerous. Several gear motors are installed, in addition to the variable-speed drives noted above, supplemented in a few cases by multi-speed motors (see Table I). Timken roller bearings are used in all conveyor idlers. Alemite pressure lubricating equipment is used to lubricate bearings difficult to get to. And, in addition to the instances cited above, SAE-1045 liner plates are used in certain other chutes carrying coal or refuse and water.

Operation of the King preparation plant is supervised by Emil B. Keenan, preparation engineer, assisted by a coal inspector (one shift) and Dan Garber and Neils Christensen, shift foremen. Aside from the above supervisors and inspectors, a crew of 26 men is employed each shift, as follows: five tipplemen, seven pickers, four car droppers, four box-car men, two control-men, one washer operator, one tipple mechanic, one tipple cleaner and one truck driver.

Table I—Motor and Drive Equipment, King Preparation Plant

Equipment	Motors No.	Type*	Hp.	Speed	Drive
Mine-run feeder	1	K	6 8 10	600 900 1,200	Spur gears to adjustable-throw crank drive.
Mine-run crusher	1	K	40	600	V-belts and spur gears.
Mine-run belt	1	K-gear	10	...	Gearmotor-roller chain
Mine-run shakers	1	KR	20	900	V-belts.
Picking tables	2	K	5	1,200	V-belts and spur gears.
Lump crusher	1	K	75	720	Flat belt-spur gears
Crushed-coal elevator and return belt conveyor.	1	K	35	1,200	Spur gears to flat belt to spur gears.
Degradation conveyors	2	K-gear	5	.....	Gearmotors.
Washer-feed conveyors	1	KT	40	1,200	V-belts and spur gears.
Washer compressor	1	KF	60	3,600	Direct.
Washer elevators	2	K-gear	5	.....	Gearmotors.
Washer air valves	1	K-gear	2	.....	Gearmotor.
Middlings crusher	1	K	15	1,200	V-belt and spur gears.
Plant-refuse conveyor	1	West.	15	.....	Gearmotor.
Classifying screens	1	KR	20	865	V-belts.
Dewatering vibrator ($\frac{3}{16}$ x 1$\frac{5}{8}$)	1	K	7½	1,800	V-belts.
Elevating conveyor ($\frac{3}{16}$ x 1$\frac{5}{8}$)	1	K	15	900	V-belts and spur gears.
Screw conveyor (−$\frac{3}{16}$ to elevator)	1	K	3	1,800	Speed reducer.
Shaking dewatering screen (−$\frac{3}{16}$)	1	K	7½	1,200	V-belts.
Redler elevator to dryers (−$\frac{3}{16}$)	1	K-gear	20	.....	Gearmotor-roller chain.
Sludge conveyor (10 f.p.m.)	1	K	10	1,200	V-belts to speed reducer to roller chain.
Cross conv. to dryers	1	K	15	900	V-velts and spur gears.
Circulating water pump	1	KT	100	1,200	Direct.
Tank-bleeding pump	1	K	20	1,200	Direct.
Pond pump	1	U. S.	50	3,600	Direct.
Heat-dryer feeder	1	K	5	1,800	Variable gear and V-belts.†
Heat dryer	1	K	25	1,200	V-belts.
Pulsator	1	K	2	1,750	Variable gear and roller chain.†
Exhauster	1	K	50	1,750	V-belts.
Heating-furnace stokers	1	..	3	.....	.....
Furnace fan	1	K	10	1,200	Direct.
Dried-coal conveyor	1	K	30	900	V-belts and spur gears.
Centrifugal dryers	2	KG	50	1,200	V-belts.
Dried-coal coll. conv	1	K	10	900	V-belts and spur gears.
Redler elevating conv	1	K-gear	20	.....	Gearmotor.
Lump boom	1	K	10	1,200	Reducer-roller chain.
Stove boom	1	K	10	1,200	Spur gears — roller chain.
Nut boom	1	K	7½	1,200	Reducer-roller chain.
Boom hoists	3	..	7½	.....	.....
Primary mixing conveyor	1	KG	25	1,200	Silent chain-spur gears.
Auxiliary mixing conveyor	1	K	25	1,200	Reducer-roller chain.
Lowering conveyors, stove and nut box-car loader	2	K	2	1,200	Reducers-roller chain.
Lowering unit, lump box-car-loader shuttle motion	1	..	1	.....	.....
Retarding conveyor	1	..	5	.....	.....
Box-car loaders	2	Louis Allis	15	500 800 1,000	Roller chains.
Clean-up conveyor	1	K	5	1,200	Reducer-roller chain.
Clean-up elevator	1	K	15	1,200	Reducer-spur gears.
Crusher, lump, stove, nut, clean-up coal	1	L	100	720	V-belts and spur gears.
Crushed-coal conveyor	1	M	50	720	V-belts and spur gears.
Blending-plant feed conv	1	KT	10	900	V-belts and spur gears.
Distributing conveyor	1	KT	5	900	V-belts and spur gears.
Vibrating screens (−1$\frac{5}{8}$)	4	K	5	1,800	V-belts
High-speed shaker	1	KT	10	900	V-belts
Pea crusher	1	K	15	900	V-belts.
Pea return conveyor	1	K	20	900	V-belts and spur gears.
Plate feeders	3	K	5	1,800	Variable gears.†
Blending conveyor	1	KG	15	1,200	V-belts and spur gears.
Loading boom	1	KT	5	1,200	V-belts and spur gears.
Boom hoist	1	..	7½	.....	.....
Return conv. to main plant	1	K	15	865	V-belts and spur gears.
Fuel conveyor	1	KT	5	900	V-belts and spur gears.
Waxing-system pumps	1	..	1	.....	Direct.
	1	..	2	.....	Direct.
Oiling-system pump	1	..	2	.....	Direct.
Heating-plant stokers	2	..	5	.....	.....

* All General Electric unless otherwise specified. † Link-Belt "P. I. V." gear.

STOCKING AND RECLAIMING

+ 150,000-Ton Pile Near Tipple Handled by Portable Conveyors

• Coal stocking at the Dehue mine of the Youngstown Mines Corporation, in Logan County, West Virginia, spreads employment over the year while at the same time enabling the operation to meet demands during the lake-shipping season. Ground area for storage was doubled a few years ago by confining a creek in a concrete culvert. Stocking is done with portable conveyors—also used with a portable loader in reclamation and loading. Storage is handled by the tipple crew and adds less than 2 mills to production cost. Labor for loading from the pile into cars is not more than 3c. per ton. Investment in stocking facilities, including culvert cost, is $35,000.

EIGHT years' experience has proved the practicability of a system of stocking coal adjacent to the tipple by using portable conveyors and then reclaiming with a portable loader in combination with the same conveyors. At Dehue mine of the Youngstown Mines Corporation, a subsidiary of the Youngstown Sheet & Tube Co., a maximum of 150,000 tons of mine-run has been stocked by that method while the lakes have been closed to shipping.

During the first few seasons of stocking experience at this mine, which is in Logan County, West Virginia, the situation was watched closely by taking temperature readings frequently at various depths over a pile area. During reloading, hot spots have been found, but only once was a fire encountered.

For the first three seasons a pile 44 ft. deep was stocked in two 22-ft. layers. Since then the pile has been laid down in a single layer and the maximum depth has been increased to 50 ft. Tests have indicated that maximum temperatures usually occur in a zone 10 to 15 ft. from the top of the pile. It is the supposition that the lesser heating below that level is due to the tendency of the coal to segregate. The coarser sizes roll down the end of the advancing pile and the fines accumulate near the top.

The coal is from the Eagle seam and the mine output is used in by-product ovens to manufacture metallurgical coke. Volatile content of the coal averages 31 per cent; sulphur, 0.64 per cent; and ash, 4.50 per cent. The principal reason for stocking is to spread employment over the year. Instead of closing the mine when the lake shipping is stopped by ice, stocking allows the mine to be operated two to three days per week through the winter, thus preserving the organization and giving employment (*Coal Age,* p. 164, April, 1932).

Fig. 1—As viewed from the headframe of the hoisting shaft. Conveyors in stocking position on top of the pile.

Fig. 2—Top of pile from mountainside. The two conveyors at left are installed in a semi-permanent manner.

Figs. 1 and 2, which are from views taken the same day but from different angles, show twelve portable conveyors carrying the coal from the tipple to the stockpile. Two main conveyors delivering from the tipple to the two parallel strings of portables are installed in a semi-permanent manner 25 ft. above the ground. Stocking rate is 300 tons per hour; thus the two main units must handle that capacity and the smaller units half of that tonnage.

The two main conveyors and the first conveyor of each parallel string are Jeffrey 45-ft. units with 30-in. belts. Eight other units are Barber-Greene with 24-in. belts. Six of them are 45-ft. low-type and two are 60-ft. stacker type. One other Barber-Greene portable stacker, 24-in.x60-ft., not in use at the time the photographs were made, completes a list of thirteen portable conveyors. Originally the stackers were used for elevating duty—that is, when the pile was built retreating and in two layers, instead of advancing and in one layer as is now the practice.

Reclaiming from the pile and loading into railroad cars is done at the rate of 250 tons per hour by using a Haiss loader (Figs. 3 and 4). At the beginning, when working in that part of the pile adjacent to the railroad track, the loader delivers directly to a stacker which elevates into the railroad car. As the pile retreats, the low-type portable conveyors are interposed in series between loader and stacker. Maximum loading from stock into railway cars in one 7-hour shift was 1,890 tons.

Stocking Area Doubled

In 1934 the ground area available for stocking was doubled by building a reinforced concrete culvert 720 ft. long in the creek bed (*Coal Age*, p. 146, April, 1934). This covering of the creek was necessary because of the narrow valley. To store 150,000 tons within 500 ft. of the tipple requires carrying the pile to full height above the creek and over to the mountainside.

To place the coal in stock instead of loading into railroad cars direct from tipple adds less than 2 mills per ton to the production cost because the same tipple crew handles the work. Only additional expenses are electric power and repairs for the loader and conveyors. Labor for loading from stock into railroad cars does not exceed 3c. per ton. Investment in stocking facilities, including the construction of the culvert, is $35,000.

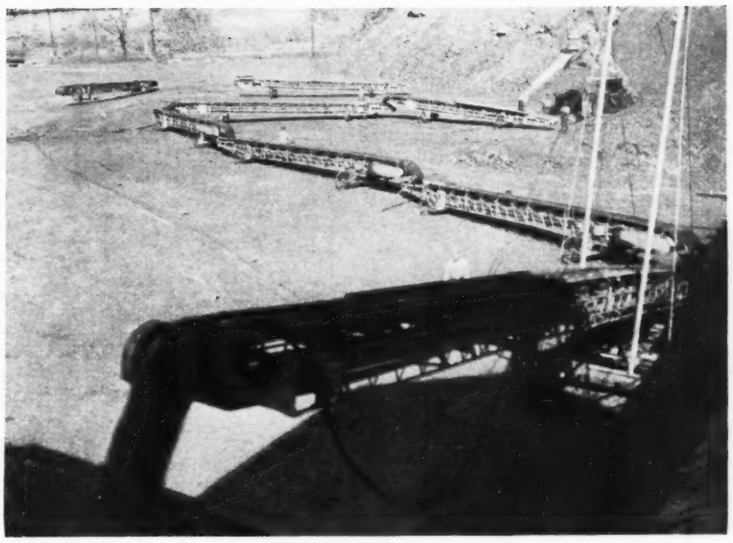


Fig. 3—Six conveyors in series are carrying the coal at 250 tons per hour from loader to railroad car.

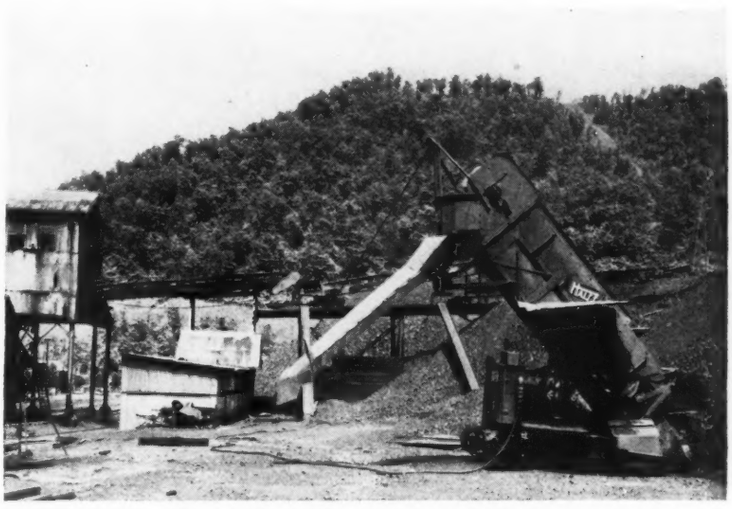


Fig. 4—Close-up of the crawler-type loader.

Fig. 5—To make available sufficient area for stocking, the creek was confined in a culvert.

TREVORTON PLANT

+ Prepares Low-Ash Steam-Size Anthracite

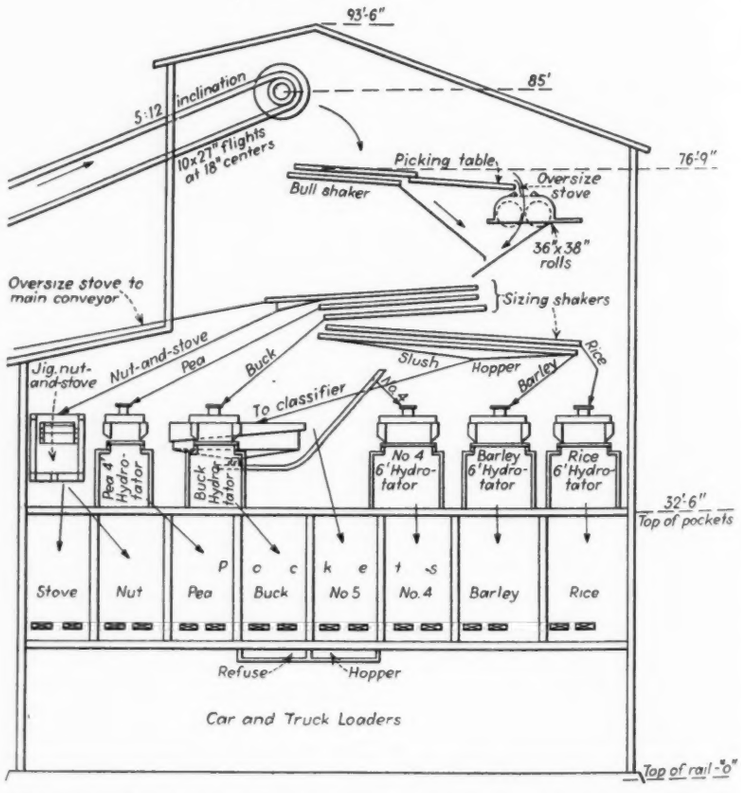
A preparation plant that cleans little coal that is larger than buckwheat has been erected in Trevorton, Pa., using an upward flowing current of water to clean pea and the larger steam sizes and to both clean and classify the finer coal. No. 5 buckwheat is segregated. A jig cleans stove and nut coal as a unit. An unusually clean product is obtained. The coal is slushed into the plant with water.

By R. DAWSON HALL
Engineering Editor, Coal Age

TO CLEAN an 800,000-ton coal bank located at Trevorton, Northumberland County, Pennsylvania, the Stevens Coal Co., of Wilkes-Barre, Pa., completed the erection last October of a preparation plant to handle 800 to 1,000 tons in a seven-hour day. The bank consists almost entirely of sizes below pea, and the strange scarcity of larger material apparently is attributable to the fact that the North Franklin mine, long idle, from which the coal came, operated in such a clean Lykens coal seam that it was able to ship all the domestic-size coal—which was all the market would then take—almost without any cleaning at the tipple. Thus, the fine sizes cast on the dump are found to be relatively free of large refuse. Whether this condition will continue is not certain.

Coal in this dump sometimes contains as little as 10 per cent ash, but it probably will average about 16.4 per cent. In the earlier days it would have passed muster without cleaning, but, for modern requirements, preparation is necessary, and the ash percentage of barley will run 9.88, with a sulphur percentage of 0.65. As the ratio of volatile matter to fixed carbon is about 1:9.4, the coal leans well over to the free-burning, gas-making type. A typical analysis as received would run: moisture, 1.19 per cent; volatile matter, 8.57; fixed carbon, 80.48; ash, 9.76; sulphur, 0.65; B.t.u., 13,650, and fusion temperature, 2900+ deg. F. The calorific value, which is unusually high for any size of anthracite and especially for barley, shows, as does the luster of the coal, that exposure has left it superior to most of the freshly mined product of the anthracite region.

As the breaker has been erected at the edge of the coal dump, with its foot a little lower than the base of the coal pile, the coal is being fed to the breaker by water. At present a sort of cliff has been formed by excavation into the heart of the dump. To the top of this coal cliff a Le Tourneau 16-cu.yd. Carryall



Elevation or flowsheet of Trevorton preparation plant. One lone jig takes care of all sizes larger than pea, but it has little to do. The classifier is behind the buck unit, receiving its material from the slush hopper and delivering its underflow to the No. 4 unit and its intermediate flow to No. 5 pocket.

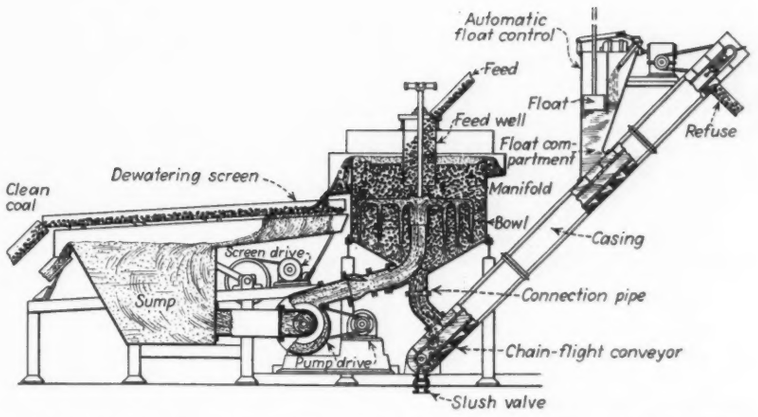
brings the coal, dumping it near the edge of the excavation. A bulldozer pushes it over the cliff, where a fire hose with a suitably directed stream of water passes it into a flume laid on the ground, leading to a pit, whence a chain-flight conveyor transports it to the top of the preparation plant. The fire hose works under light pressure, hence one can hardly term it a "monitor"—the term used in gold-mining camps—for there is none of the spectacular rending away of material or the uprooting of trees so characteristic of California placer operations.

The man with the fire hose, when he finds large pieces of impurity, casts them to one side, and every day about three truckfuls of such refuse is removed. The flumes are not built for such heavy material, and it is not desirable that the breaker should have to handle or reject it. Desire not to break the coal either on the bank or in the flume also explains why a more powerful stream of water is not employed. However, only 0.55 per cent of the coal shipped is larger than buckwheat, and, though the facilities for handling these larger sizes are retained, they are little used. It was thought that the bank had been picked over by local consumers of anthracite—as has been customary from time immemorial elsewhere in the anthracite region—and that, when the heart of the bank was reached, larger material would be found, but this did not prove true.

Flushed Coal Enters Plant

From the hopper the coal, with practically all the water used in the flume for its transport, is carried to the top of the building, the height of which is 93 ft. 6 in., up a 5:12 incline by a chain-flight conveyor having 10x27-in. flights at 18-in. centers. Coal delivered at the top of the plant goes to a bull shaker with a 4½x12-ft. stove-size screen which delivers oversize to a 5x12-ft. picking table, where the impurities are picked from the coal, which then goes to 36x38-in. rolls, thereafter joining the undersize from the bull shaker and passing to the sizing shakers for unprepared coal.

These make: (1) oversize-stove, (2) stove-and-nut, (3) pea, (4) buckwheat and (5) rice-and-under, which last goes to two other screens to make (1) rice, (2) barley and (3) slush. Stove-and-nut coal goes to a Wilmot jig, pea coal to a 4-ft. Hydrotator, buckwheat to a similar 5-ft. unit, rice and barley each to a 6-ft. unit, and the clean coal from these goes to the dewatering screen which is



Sectional elevation of Hydrotator with its dewatering screen and its automatic control, by which latter the quantity of solids in the bowl determines the speed with which the water flows upward through the connecting pipe from the elevator casing, thus regulating speed at which refuse passes to chain-flight conveyor.

part of each unit and thence to pockets, where it is unloaded into railroad cars as needed.

The Hydrotator (see above) consists of a deep hopper-bottom cylindrical tank or bowl filled with water and raw coal and a central pipe up which water containing fines passes from a centrifugal pump located outside the bowl. None of this water directly enters the tank, but, having been carried by the pipe for some distance above the bowl bottom, it passes into a six-armed manifold, each arm having three nozzles inclined downward 30 deg. from the vertical. Passage of water from these nozzles causes the manifold to revolve on its axis.

By this manifold the water is directed at several points into the bottom of the bowl. Impinging on the latter it again rises, lifting the coal and allowing slate and other refuse to fall. It is asserted that there is no stirring, eddying or other agitation, just a steady upward motion that the lighter material cannot resist, but which the heavier material can and does overcome, so that the latter material falls into the hopper. For fine material, quiet, persistent motion in a uniform direction is essential if the cleaning is to be exact. The upward movement of the lighter material causes it to pass with the water, which wells over the entire edge of the bowl and is directed to the screen by a flume around the bowl top.

Coal does not wet easily, so a pipelike approach dipping well down into the water, termed a "feed well," is provided, obliging the feed to descend into the water and become entirely submerged. The coal, being light and also dry, resists submergence, but the piling of more feed coal above it in this restricted inclosure overcomes its "reluctance." However, in this instance, the coal is so wet after being carried in tumbling water both along the flume and up the conveyor and being wetted on the screens that it needs no submergence to complete its wetting.

A pipe from the bottom of the hopper leads to a chain-flight conveyor which removes the refuse as fast as it arrives. As the water in the conveyor casing is relatively clean it is light and reaches a level higher than that welling up out of the top of the bowl. A large float compartment about 20 in. square which stems out of the tight conveyor casing is provided alongside the bowl. In this also the water is solid-free, and a float in it indicates where the water stands and designates the specific gravity at which the washing is being effected. After the desirable level is determined the Hydrotator automatically takes care of any fluctuations. Water enters the float compartment at all times, and the float regulates its quantity. When the float rises, the quantity of water delivered is decreased.

As the feed loads down the water in the bowl, the density of the liquid is greater than that of the relatively solid-free water in the conveyor casing and in the float compartment. For this reason the water stands always at a higher level in the casing and compartment than in the bowl. If, however, the feed contains much impurity, the density of the liquid still further is increased and the water level in casing and float compartment rises to greater heights. Because of the decreased passage of water into the bowl thus resulting, more refuse is permitted to pass down into the conveyor, which lowers

the density in the bowl to normal. Moreover, the rise in the water lifts the float in the float compartment, which automatically partially shuts off the inflow of water at that point. This still further reduces the normal flow of water into the bowl, thus further aiding in the escape of refuse.

On the other hand, if the weight of the mixture in the bowl is insufficient, the water will flow down the conveyor casing and the float compartment and enter the bowl through the connecting pipe in increased volume, thus retarding the outflow of refuse in that restricted passage and raising to normal the specific gravity of the mixture in the bowl. Thus the balancing forces tend of themselves to correct improper functioning. When "tuning" the equipment, specific gravity is varied by changing the speed of the impeller, thereby changing the volume delivered by the pump and the pressure with which the water is delivered.

On page 49, the coal can be seen to the left flowing and being shaken over a long dewatering screen through which the water passes to a sump and thence to the centrifugal pump where it is delivered to the bowl. To this water, wherever the coal is larger than barley, a quantity of undersize coal has been added to increase the density of the liquid.

All the slush, or minus $\frac{3}{32}$-in. coal, from the main screens goes to a Hydrotator classifier. The latter resembles the Hydrotator, but the bowl is of much greater diameter; in this instance 16 ft. As in the Hydrotator, the bottom is hoppered so as to bring to the center the larger and heavy fines as they fall into the bottom of the bowl. The purpose is to size the material rather than to separate heavy from light, but the classifier does both. The pipe entering from the bottom in the classifier, as in the Hydrotator, admits water at all times, checking the downflow of coarser fines from the bowl to the conveyor.

The feed, instead of entering in the center, enters at a point near the periphery, so as not to pass into the pump intake and so as to be as far as possible from the No. 5 discharge, and much of it goes into suspension in the bowl. This suspension is maintained by an agitator having six pipe arms symmetrically situated in a horizontal plane. These receive water pumped by an impeller mounted on a central shaft which derives its water from the bowl of the classifier. Five nozzles, distributed on each of these arms and pointed at about 30 deg. to the vertical, discharge water into the bowl and cause the agitator to revolve slowly in the opposite direction to that of the discharge.

In the overflow 22.3 per cent of the coal is over 48-mesh, but only 1.5 per cent over 28-mesh; all of the rest of the coal is smaller and much of it far smaller. Though the ash content averages only 10.3 per cent, the lack of a market for such fine coal causes it, despite its cleanliness, to be consigned to waste.

That which is held in a stratum in the mid-level of the classifier is somewhat coarser and convertible to No. 5 buckwheat, for which a market is beginning to be found; 85.6 per cent of it is over 48-mesh, and 17.6 per cent over $\frac{1}{16}$-in. This coal is removed from the bowl by pipes and control valves and passed over a 5x10-ft. Selectro vibrating screen with 28-mesh Ton-Cap cloth to free it of water and the finer coal particles. The screen removes most of the water and half the minus 48-mesh and raises the sizes over $\frac{3}{64}$ in. from 40.4 to 44.5 per cent.

Effect of the screen in retaining the larger particles of coal and ridding the mass of the finer particles is seen best in the screen analysis of the reject which has passed through the screen; it has only 11.7 per cent exceeding and including 28-mesh, whereas the No. 5 coal fed to the screen showed 66.2 per cent of that particular size range. The effect of removing the fine particles is to reduce the ash from 15.7 to 11.8 per cent. This coal is being stacked, but some already has been shipped. The undersize of the screen is definitely dirty, running 26.6 per cent ash; this material is wasted.

Underflow from the classifier passes over a small 3x6-ft. Selectro vibrating screen with $\frac{3}{64}$-in. Ty-Rod screen cloth. By passing the coal through the classifier the proportion of $\frac{3}{32}$-in. coal has been increased from 2.5 to 14.4 per cent, $\frac{1}{16}$-in. coal from 11.4 to 33.6 per cent, and $\frac{3}{64}$-in. coal from 12.6 to 24.5 per cent.

Cuts No. 4 Ash 8 Per Cent

After screening, this coal goes to the No. 4 Hydrotator, which converts a 19.1-per-cent-ash coal to a coal with only 11.4 per cent of ash, an unusually low figure for No. 4 anthracite. As the No. 4 Hydrotator undersize at Trevorton runs low in ash, it may be taken to join the feed on the large vibrator or it may be discarded.

In one test, pea coal had 7.7 per cent of ash; buckwheat, 9.4; rice, 9.8; barley, 8.9; No. 4, 11.4, and No. 5, 11.8 per cent. The Selectro screens give a choice of eight lengths of stroke, are readily adjustable and can be tilted when running. They run with the moving parts in oil. All pumps but one were supplied by Barrett, Haentjens & Co. All the rest of the equipment was furnished by the Wilmot Engineering Co., which also designed the building, the steel work of which was erected by the Weatherly Steel Co. Heating equipment was furnished by the L. J. Wing Manufacturing Co. The Trevorton plant belongs to the Stevens Coal Co., of which Nat D. Stevens is president and George H. Jones is general superintendent.

Trevorton anthracite preparation plant. Coal is brought to the hopper by water from coal bank on left. Building is a steel structure covered with alloy steel.

CINCINNATI CONVENTION

+ Highlights Steadily Rising Interest In More Efficient Production Methods

HOW GREAT the determination of the coal-mining industry to continue its drive for more efficient production methods was again dramatically displayed at the 16th Annual Coal Convention and Exposition of the American Mining Congress at Cincinnati, Ohio, April 24-28. Suspension of operations in the Appalachian region and the imminent shutdown in outlying districts cast only a light shadow over total attendance. And what was lost in numbers was more than made up in the keenness of interest of those who did register. Excluding the usual delegation from the Standard Coal Co. of Indiana, who were too busy turning out coal to be present, total attendance was 10 per cent under the 1938 figures.

As in the past, mechanical loading had the lion's share of the technical program, with surface preparation a close second. One session was devoted to safety. Roof control, selective mining, maintenance and stripping also were featured. Discussion of national economic problems centered upon Federal regulation of the bituminous industry, the benefits of mechanization and legislation to control stream pollution.

What Exhibits Mean

Declaring that this annual session was a "stimulating occurrence," Julian D. Conover, secretary, American Mining Congress, asserted that 250 operators and manufacturers had participated in the committees and had labored in the promotion of the meeting. Despite labor negotiations at New York and Springfield, said W. J. Jenkins, national chairman, program committee, few who usually attend the Cincinnati Convention would be absent this year. The manufacturers form "the mechanical research division of the industry" and the exhibit presents to the operators an opportunity to benefit from that research. The exhibit was larger and finer than ever, added Roy L. Cox, chairman, Manufacturers' Division.

About the only phase of the coal regulation upon which there is real unanimity of opinion, declared George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co., is that the long delay in fixing minimum prices has been bad. If coal is to be regulated and taxes are to be levied upon production, then there is a general belief that the levy upon coal should not be disproportionate and favorable to competitive fuels. Neither should control be such as to duly handicap coal in the competitive battle.

Leadership, continued Mr. Harrington, depends upon keeping abreast of changing conditions. Low costs result in profits and permit operation on a sound basis. Production methods, he asserted, have kept pace with technological improvements and sound operating practices; the chances for any substantial cuts in that division, therefore, are not in the picture. Candid railroad executives do not deny that present rail freight rates are too high. The railroad situation at present, however, is such that prospects of early relief in that element of delivered costs are dubious. The greatest opportunities for improving the coal picture lie in the field of sales costs. Included in that, said Mr. Harrington, are losses due to sales at ruinous prices. Stabilized market conditions will eliminate many expensive practices.

Gavel Wielders

Wesley S. Harris, president, Bicknell Coal Co., was chairman of the first technical session of the 16th Annual Coal Mining Convention and Exposition of the American Mining Congress at Cincinnati, April 24-28. Chairmen of the other seven sessions were:

C. S. Blair, vice-president, Black Diamond Coal Mining Co., Monday afternoon.

D. H. Pape, president, Sheridan-Wyoming Coal Co., Tuesday morning.

Thomas G. Fear, general manager, Elk Horn Coal Corporation, Tuesday afternoon.

A. J. Ruffini, superintendent, Wheeling Township Coal Mining Co., Wednesday morning.

Newell G. Alford, consulting engineer, Eavenson, Alford & Auchmuty, Wednesday afternoon.

W. J. Jenkins, president, Consolidated Coal Co., Thursday morning.

Charles W. Connor, general superintendent of mines, American Rolling Mill Co., Thursday afternoon.

Split on Regulation

Turning directly to the present regulatory set-up, Mr. Harrington found three schools of thought in the coal industry. One believes that the industry would be better off without "any government meddling." A second group concedes the necessity of some regulation but feels that the present law goes too far in putting the industry into a straitjacket. The third group argues that the act should be given a friendly trial. Members of this last group feel that the Guffey law reflects the majority opinion as to the best approach to the problem. The Allen bill, sponsored by the committee for amendment of the Guffey law, added Mr. Harrington, is almost complete repeal of the present statute.

"I have for long believed that the industry could best work out its own destinies largely under its own initiative, working chiefly on a district or regional basis but tied together on national lines—to the minimum

degree consistent with national and overlapping problems," stated Mr. Harrington. "On prices and market policy, I have liked the marketing-agency method, but I have felt that this method is futile without more freedom from anti-trust restrictions and without some positive enforcement power. To obain these latter essentials I have assumed it reasonable and necessary to be willing to give up some measure of self-determination and to vest a reasonable approval or veto power in a Federal authority. There is a whole lot in the Guffey Act that I do not like—most particularly the price-fixing formula. It has not yet been demonstrated that the plan will work, but, on the other hand, it has not been demonstrated to my mind that it will not work. The fear that a Guffey-Act type of control may grow into an all-embracing governmental operation or straitjacket—stifling self-management and initiative—concerns me greatly. I would much prefer a simpler form of act, but only if the latter can be equipped with so-called teeth."

Pollution to the Fore

Thirteen States, not all of them coal producers, as well as the Federal Government, are considering legislation to reduce or prevent stream pollution, said J. W. Woomer, chief mining engineer, Hanna Coal Co. Formerly most of the mines of the United States were located in an unoccupied wilderness; now life has sprung up all around, and stream pollutions that once were regarded with indifference are now felt by many to be intolerable. The mining industry cannot afford to await events; it must march out to meet them, especially since it is the industry that is most greatly condemned for its water pollution.

Six questions have to be answered before the problem can be tackled intelligently: (1) Generally speaking, are there not more fish now than there were twenty years ago? If not, the extensive fish-propagation policies of the various States mean nothing. (2) Is soil erosion, which makes streams flood one day only to dry up the next, a more potent fish destroyer than mine pollution? (3) Where should treatment of mine water stop, and dilution and drinking-water treatment start? (4) Is the sealing of abandoned mines economical and practical over a period of time? (5) How long will it take for fish and fish food to be reestablished in a stream in which yellow iron oxides have been deposited for years? (6) Will cities on river banks cooperate in maintaining the purity of river water by providing adequate expenditures for sewage disposal?

To take care of the acidity by neutralization would require capital expenditure of $180,000 for a 3,000-ton mine in the No. 8 field of Ohio. If this money were expended, no place could be found for the disposal of the sludge. It is time, declared Mr. Woomer, that some central body should direct, if not carry on, pollution-legislation activities, freely acknowledge the problem of population centers, but insist that the relative facts of coal pollution versus other pollutions—notably sewage—be made general information. No law must be passed that demands something impractical.

No suggestions can be obtained from Great Britain, declared John C. Cosgrove, president, Bituminous Coal Research, Inc., because mines of that country produce little acid water and the streams are so short from mine to seaboard that pollution, if any, raises no problem. Moreover, British mines usually are deep and receive little water.

"Quotation Permitted"

An innovation in the technical sessions of the American Mining Congress Cincinnati Convention was introduced this year when delegates who discussed the formal papers presented were assured that the Congress would not publish their remarks without their express consent. The convention story in these pages has been written in keeping with the spirit of that innovation. In every case where discussion has been summarized, express authorization of such publication has been given to Coal Age by the particular speaker quoted or mentioned.

When the problem of mine drainage was first raised, neutralization by the use of lime was undertaken but found to be impracticable because disposition of the resultant sludge could not be successfully made, stated David B. Reger, consulting geologist, Morgantown, W. Va. At present, to prevent oxidation, abandoned mines, or worked-out areas of active mines, are being extensively sealed. This method, though attended by considerable reduction of acidity, has been costly and has caused much apprehension among operators because of the accumulation of gas and water in old workings adjacent to presently mined areas.

The solution, in Dr. Reger's opinion, lies in the complete removal of ferrous compounds from mine waters that contain large quantities and utilization of these materials for the manufacture of chemical products that should pay for the cost of removal. His studies, through a period of years, have shown that only one-fourth or one-fifth of the mines are highly acid and that if these be treated for removal of ferrous substances there will be a general restoration of alkalinity in the streams.

Removal of these materials by the Kaplan-Reger process of purifying mine water can be accomplished at comparatively small cost. The resulting mineral pigments and oxides, while valuable to the extent that they are needed in industry, can in general be further treated in central chemical plants for subdivision into more diverse and more widely used products. Mine operators should, in the future, follow the clue offered by many other industries which successfully treat their waste products. There is one West Virginia mine known to emit 6,000,000 cu.ft. of methane per day with a value—if separated from the mine air—of $600. The chemicals in acid mine waters, added Dr. Reger, are in the same category and can be used for an eventual profit if the simple primary segregation be coupled with further treatment by some independent chemical plant that may be glad to buy the sludge as raw material.

Though the waters of some British mines are quite aid, most seem to be reasonably low in acidity, explained R. Dawson Hall, engineering editor, *Coal Age*. The workings near the surface in general are old and have closed tightly, excluding water. Moreover, longwall, used so generally in Great Britain, breaches the surface less than room-and-pillar workings, especially where plenty of rock is stowed. Many of the coal fields are covered with thick measures of dolomitic limestone, and the magnesium limestone is more alkaline than that which, like ours, has a high calcium content. Most of the sulphate is made in the mines by moist air, and it will stay as crystals in the mine if water is not allowed to flow over it. Without actual flooding, little of it will reach the surface.

To prevent water from getting acid, get it out of the mine as soon as possible, by pipe if need be. That really is only an approximation to the truth, however, for water left in the mine and not allowed to gain in level will do no harm and may become alkaline. Pump water only once or twice or not at all. Do not pump from swag to swag and thus let water rise and fall, for, in rising, it will dissolve sulphate and, in falling, will expose more pyrite to oxidation. Under water, pyrite will not oxidize, but, away from water and in the presence of moist air, it will oxidize readily.

Putting Bacteria to Work

Bacteria are found in the mines which convert hydric sulphate to hydric sulphide, but they also change metallic or earthy sulphates to sulphides. Thus, ferric sulphate becomes ferric sulphide, or pyrite, and falls to the bottom of the sump or swag. It is not acid and it clears the pool, but, being microscopic, it is potentially acid. Give it oxygen and it will flash back into sulphate. But the purer water can be pumped or drawn off the top.

All entering water is alkaline. Measures through which the waters pass may be pyritic, but no sulphates will be formed, for there is no air to effect the conversion. It is in the mine where there is air as well as water that the damage is done; much of it in those acre-wide sumps which—to save power peaks and to transfer loads to the night shift—are allowed to rise and fall. Inimical and ill-considered legislation needs fighting, but meantime let

industry do what it reasonably can, and above all let Bituminous Coal Research, Inc., add this to its program of inquiry, concluded Mr. Hall.

Much progress has been made in stripping practice, as evidenced by the advance from the ½-cu.yd. excavator to the present mammoth 32-cu.yd. units, said C. M. Guthrie, superintendent, Seneca Coal & Coke Co., in a paper read by William R. Chedsey, director, Rolla School of Mines, and detailing with lantern slides the introduction of the Dart trucks, at the Mark Twain mine of the Huntsville-Sinclair Mining Co., which carry 40 tons of coal at a speed of 35 miles an hour. Each of these has traveled 30,000 miles in one year. He showed also the 80-ton-capacity semi-trailer which has two butane engines which each drive a General Electric d.c. generator, each of which, in turn, feeds an electric motor, one for each of the two tandem driving axles. Speed is changed by varying the fuel feed by a foot petal. This last is in use at the Tiger mine of the Hume-Sinclair Coal Mining Co. Another new device is the knee-action loading shovel which has two booms, giving a better cleaning action than with a single boom.

Proving Mechanical Loading

A CAMPAIGN to publicize the benefits of mechanization to workers, the mining communities and the general public was urged by L. E. Young, vice-president, Pittsburgh Coal Co. Such a campaign, he suggested, might well be sponsored by the American Mining Congress. July 9, 1924, when the first local agreement on mobile-loading-machine rates was made in Illinois, he continued, and Sept. 16, 1928, when the first State-wide provisions for such rates were incorporated in the Illinois contract, are historic dates in modern coal-mining mechanization. In the Appalachian region, mechanization received its big impetus when the 7-hour day was adopted in 1934, and the movement was furthered by increases in wage rates.

Where natural conditions are favorable to the use of high-speed machines, the rapid advance in mechanization may be expected to continue until coal-production costs are in line with those on competitive fuels. Then the picture will change, with progress at a slower rate because further advances will have to be made in areas where natural conditions are less favorable.

When the American Mining Congress started on a five-year program in support of mechanization in 1928, its committee on mechanized mining announced that the following benefits might be hoped to be attained:

> For the public it will mean cleaner and more economical coal; for the miner, safer working conditions through better supervised, better ventilated, concentrated working places—and an opportunity to raise materially his economic status because of the numerous specialized tasks incidental to the mechanical mining of coal; for the operator it will mean more continuous and more profitable recovery of his coal; for the manufacturer of mining equipment it offers a great opportunity to serve the industry and assist it in arriving at that efficiency and prosperity for which it is striving.

The program of 1928, declared Dr. Young, can well be affirmed in 1939 and all parties who will benefit from the spread of mechanization should join in publicizing its advantages. These parties include the consumers, operators, mine workers, mining communities, manufacturers and railroads.

Mine management should take the initiative in presenting the story of mechanization in the local mining community. This should be done through simple illustrations stressing that mechanization will save and make jobs. Wherever possible, the story should be told under the auspices of the local union. On the safety side, mechanization means a marked reduction in hernias and sprained backs. The records also show, continued Dr. Young, that mechanization means a reduction both in frequency and severity in other face accidents. Much of this improvement, of course, is attributable to better supervision. Group work also eliminates the careless worker, as the team will not want to work with a man who habitually jeopardizes their collective security.

With the machine, he pointed out, the physical strain is much less on the human worker. Raising coal 50 in. to shovel it into a mine car calls for the expenditure of 3.8 times as much energy as lifting the same coal 14 in. onto a conveyor. With equal rates of pay, a man on a conveyor crew, he added, can earn a dollar in 54 per cent of the time that a hand loader must employ for the same sum.

Mining communities, too, have a big stake in mechanization. A protracted suspension because a mine is unable to sell its output in a competitive market, said Dr. Young, soon manifests itself in failure to pay taxes. This, in turn, means a let-down in public-health services such as sanitation, in poorer roads, in loss of payrolls and in distress to local merchants. The only other alternatives are a shifting of the tax burdens to others in the community who are ill-qualified to assume the increased load or to the State as a whole.

Time studies should continue regularly after the trial or adjustment period in the introduction of conveyors, maintained C. P. Brinton, mining engineer, Barnes & Tucker Co., in a paper read by T. F. McCarthy, general superintendent, Clearfield Bituminous Coal Corporation. All conveyors in a mine should be standardized so that parts are interchangeable. Use of approved junction boxes was mentioned specifically as most important in planning the electrical system for efficiency and safety. Slides were presented to picture a conveyor layout using a mother belt and three to five chain room units working rooms and bringing back pillars by cutting through at intervals, then working back open-ended for short distances where roof conditions will permit. Systematic timbering is followed and the lantern slides indicated this posting.

In a brief paper of his own Mr. McCarthy stressed five principles which if recognized and followed through should contribute to success in conveyor work. These are: (1) management and face supervision properly organized, (2) miners convinced of desirability of the work, (3) the right equipment for the job, (4) the mining system best suited to the conditions and (5) adequate performance studies and assembling of comprehensive cost records. He recommended the use of the time-study and cost-accounting forms recently presented by a committee of the American Mining Congress.

With a Joy 8BU loader delivering to conveyors, the section cost was 48c. per ton working 70-ft. faces (206 tons mined per shift) and 53c. per ton working 40-ft. faces (142 tons per shift) at New Castle mine in Alabama, related Harold McDermott, vice-president, New Castle and the Stith Coal companies. In New Castle, where, of a 16-man machine crew, five men pick refuse from the conveyors, loading machine and conveyors show a saving over hand loading when a 16-man crew can load 140 or more tons per shift.

Coal height is 54 in. including one 6-in. and one 3-in. rock band. Severe grades, rolls, horsebacks and bad top are characteristic of the many unfavorable conditions encountered in Alabama mines. After increasing face length from 40 ft. to 70 ft. and working eight of these longface rooms, top difficulties dictated a return to the standard 40-ft. face. At the Stith mine, a shaft operation in the Mary Lee seam, essentially the same type of mechanical mining has showed a cost of 49c. per ton and 11.3 tons per man-shift, as compared to 73c. per ton and 7 tons per man-shift with hand loading.

Average, 13.3 Tons Per Man

In Rossmore mine, West Virginia Coal & Coke Corporation, Logan County, 13.3 tons of coal per man-shift has been averaged in driving a four-heading entry with shakers 2,000 ft. to the boundary through a section where the parting is 20 to 22 in. thick. In one week the first shift produced 1,155 tons and the second 1,114 tons, said A. F. Whitt, general superintendent. Both coal and slate are shot with Cardox, principally to eliminate smoke, but there is an additional advantage in that ribs are sheared better than with powder. The top bench is left one cut back of the bottom bench; in other words the 40-in. bottom bench (after being undercut) is shot and loaded first, then follows taking the slate and finally the top bench of 30 in. of coal.

Over the territory allotted to this mine the parting increases from 1 in. at the portal to 15 ft. two miles away. Only the 40-in. bottom bench is considered minable in the more remote section. In this conveyor entry driving, which is operated double-shift, the men of a shift do not all start work at the same hour but on a staggered system which leaves the faces in the same condition each time for the next shift.

Self-loading (shaker and duckbill units) conveyors in a West Kentucky Coal Co. mine near Sturgis, said T. F. Christian, general superintendent, produce 10 to 15 tons per man-shift in entries and 15 to 20 tons per man-shift in rooms. The seam pitch is 8 per cent. Room conveyors load direct into cars on the heading and rooms being worked are spaced far enough to allow sufficient trackage between for spotting and handling cars. Room necks and the first 35 ft. of room advance are hand-loaded in preparation for installing the units.

Hard tipping of mining-machine bits and increasing cutter-bar lengths from 6½ to 8½ or 9 ft. have increased the per-shift productions of the four-man crews; the first mentioned change is credited with an additional 2 tons per man-shift. The tipped bits cut practically four times as much coal as tempered bits, making it possible to cut almost two 30-ft. rooms per set, as compared with almost two sets of bits for one 30-ft. room under former practices. Use of snubbing shots has proved a requisite with the longer cutter bars, and with this snubbing the percentage of lump compares favorably with hand-loading.

At the operation of the Blue Valley Mining Co., where the shakers discharge onto chain conveyors for transportation to the car-loading point, an average of 25 tons per man-shift is attained. One shooting of top for a loading-point duck's nest serves for working twelve rooms. Near Central City in a mine of the Rogers Brothers Coal Co., in which the extraction is better than 80 per cent, the general average per four-man crew is slightly over 100 tons. The peak was 175 tons and for thirteen consecutive shifts the average was 152 tons.

At another mine in a 66-in. seam with severe rolls, a four-man crew has loaded in excess of 100 tons over a conveyor which for a distance of 100 ft. operated through a place where the seam grade is 17 per cent unfavorable to the load. Because of surface land values, pillars are not extracted in western Kentucky. In working the shakers through rolls it is necessary to keep the pan lines cribbed up as near level as possible.

Mechanical loading of domestic coals in the Springfield (Illinois) district was discussed by George M. Smith, mine superintendent, Peabody Coal Co., Springfield. This mining is in the No. 5 vein, which is 5 ft. 2 in. to 6 ft. thick and is 230 to 250 ft. deep. Topping the coal is 2½ to 4 ft. of black slate containing niggerheads and in this slate and in the coal seam at irregular intervals clay veins known locally as horsebacks or slips occur.

Shortwall undercutting was introduced in the Peabody mines in 1928. Later, track-mounted shearing machines with 9-ft. bars were installed to replace the shortwalls. By panel system, rooms 24x220 ft. are mined by the advance face system; the only cutting is a shear cut in the center of each place. There was no change in shearing, drilling and shooting practices when the mine was mechanized. Cars are changed by mule haulage and the average number of changes back of a loading machine has been 155 to 165 cars averaging 1.9 tons each. Refuse picked in the tipple is sent to the company's plant at Carter, Ill., for recovery of coal from it.

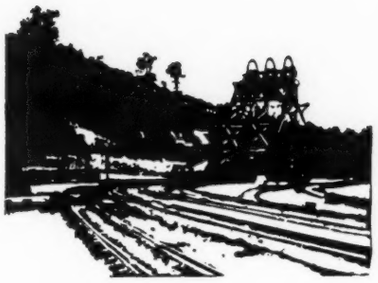
Gives Credit to Crew Selection

Immediate success with rubber-tired haulage introduced in Moss Hill No. 2 mine of the Hart Coal Corporation in December, 1936, said W. A. Vinson, general superintendent, was due in a large measure to careful selection of the crews. A spirit of competition developed at the beginning and prevails unabated. The method and mining system—a combination of room and semi-longwall work—developed by James H. Fletcher, consulting engineer, Chicago, were described in *Coal Age* (January, 1938, issue, p. 47). One change since that story has been the introduction of Cardox shooting.

Two Joy 8BU machines load into 3-ton drop-bottom rubber-tired trail cars which are pulled by rubber-tired tractors powered with 19-plate 24-cell Exide-Ironclad batteries. Each tractor pulls one car, the round trip haul is held to an average of about 1,500 ft., and dumping time is on the order of ten seconds. Maximum production from a loading machine in one 7-hour shift has been 764 tons. Ordinarily the two machines double-shifted can produce 2,000 tons per day.

Moss Hill No. 2 is in No. 9 seam, ordinarily classed as 5 ft. thick but at this mine dropping to 50 in. in spots. Cover is 40 to 120 ft., the immediate top a firm black slate 36 in. thick, and the floor a firm fireclay 10 in. thick. The mining system consists of driving the first room in the ordinary manner, then starting a series of crosscuts which are gripped out by the second and third cuts so that these closely spaced crosscuts break into each other, thus cutting off the pillars between and forming a single face the length of the room. After this face is slabbed five times, thus completing a new room, a series of crosscuts are again necked, gripped, cut together and the slabbing repeated. Dumping stations where the coal is transferred from the rubber-tired trail cars to 1½-ton mine cars consist of bolted steel hoppers, reciprocating feeder and elevating conveyor. Excavation and other costs of these dumping stations amount to 3 mills per ton of coal handled.

In the No. 1 mine of the Wasson Coal Co., Harrisburg, Ill., a change to dual haulage increased the average



production per loading machine from 156 tons per shift to 225 tons, said John H. Evans, mine superintendent, after describing the system in general and referring to an article in *Coal Age* (June, 1938, p. 33) for further details. Difficult top conditions are encountered and in the section now working, approximately 1½ hours per day per loader is reported as delay time due to bad top.

Seam thickness ranges from 54 to 72 in., averages 60 in. and the loading is done with Joy 7BU machines. Mine cars hold 1.5 tons and their size could not be materially increased because of size limitation at the hoisting shaft. The new cars, which now move a maximum of 2,150 ft. from coal face to transfer hopper, are 12 ft. long, 6 ft. wide outside and stand 30 in. above the top of the rail. They carry three to four tons.

Through drop-bottoms the cars discharge to a 12-ton hopper, from which the coal is carried to the mine cars by a flight conveyor feeder and an elevating and trip loading conveyor. Rooms are driven 1,150 ft. deep and cars are serviced through a key room which serves a total of nine rooms. Track gage is 40 in. and rooms are turned off the heading at 60 deg., then straightened up the remaining 30 deg. Cars and transfer-hopper installation complete cost $10,500 and to date 160,000 tons has been handled over the first station. It is the expectation to handle 300,000 tons total before a move and that hauls of 3,000 ft. will prove practical. Car-change time is the same as it was with the small mine cars, fewer derailments occur and less storage space is required.

Cars Might Have Been Bigger

S. M. Cassidy, manager, Weirton Coal Co., summarizing the experience of 1,000 shifts with the 10-ton Differential eight-wheel cars, installed at the Isabella (Pa.) mine in 1937, when mechanical loading was inaugurated, stated that apparently the cars could as well have been 16 ft. long instead of 14 ft. Derailments have been few, and Mr. Cassidy does not class his tracks as "good." Ten to 20 minutes is the usual time required for the two haulage men to replace a car on the track.

Forty-pound rail is used for room tracks, with the exception of one section where 30-lb. is used. The minimum radius is 30 ft. and No. 2½ turnouts are standard. Car loadings have averaged 9.2 tons but have exceeded an average of 10 tons in one section. Car weight is 7,760 lb.; length, 14 ft.; width, 7 ft., and height, 44 in. at the boom end and with 10 in. higher sides (mining height is 6½ ft.). The mine is equipped with 182 of these cars, the round trip haul is five miles and the car turn-over averages three per day.

On these cars the four independent trucks of two 10-in. wheels each are equipped with sealed ball bearings and to date no wheels or bearings have been replaced. The wheel diameter of 10 in. has proved entirely adequate and there has been no need for adding brake equipment to the second set of trucks, as was provided for in the design. Not one cent of compensation cost has been charged as directly or indirectly due to the new cars. Two men devote full time to looking after the cars. Their work consists principally of straightening dents made by bumps or falls of roof. The rest of their time is devoted to routine inspections (see *Coal Age*, July, 1938, for further details).

5½-Tonners Work Well

James Hyslop, general manager of operations, Walter Bledsoe & Co., reported favorable experience with 5½-ton cars (182 in number) 13 ft. long, 6 ft. 8½ in. wide and 3 ft. 10 in. total height in the Talleydale (Indiana) mine. Track gage is 42 in.; car wheelbase, 54 in., and room rail weight, 40 lb. (*Coal Age*, December, 1938). For a new section of the mine in an upper seam from which the coal is to be lowered and loaded into 5½-ton cars in the bottom seam, drop-bottom cars 77½ in. wide and 17 ft. 3 in. long have been installed, and, after a brief experience with these cars operating over 40-lb. tracks with No. 3 turnouts having a 53-ft. radius, Mr. Hyslop states he is sorry the cars were not built a foot or two longer.

Mechanical mining introduces the difficulty of putting expensive machinery into the hands of men to operate it for us, whereas they have been accustomed in the past to use inexpensive tools, and have been paid only for the product they were able to produce, remarked J. M. Hill, mining engineer, Christopher Mining Co., reading the paper of the president, F. E. Christopher. Hence, results and care of tools now no longer concern the employee but vitally affect the employer, who used to be wholly indifferent. For this reason, every means must be employed to develop in the employee that "spirit and timing" so necessary for success in baseball and football matches.

In most cases, it is better to take men from the home organization to act as supervisors rather than to induce men to transfer from other organizations, for bringing talent from outside robs the company's own employees of their legitimate aspirations for advancement. The supervisory forces should be divided into maintenance and operating divisions. A sub-foreman should be provided for every three loading units. Tonnages should be posted so as to develop the competitive spirit. However, if the rivalry becomes excessive, it may result in an increase in accidents. Every mine should have an efficiency engineer to make time studies and report his findings.

Character Most Important

Character, Mr. Hill regarded as the leading qualification of men appointed to supervisory jobs. Other qualifications can be acquired. All problems multiply where a mine is run on a multiple-shift basis, commented Mr. Cassidy. Cooperation is obtained with more difficulty under such circumstances and more planning is necessary.

"We appoint one of our section bosses as head on each shift, so that there is always one man on whom the entire responsibility can be placed," stated A. J. Ruffini, superintendent, Wheeling Township Coal Mining Co. Otherwise, the section bosses can pass the buck. The mine is operated on the standard-leave system. At the end of a shift a certain predetermined number of faces must be cut, a certain number of faces shot and so forth.

"Before that plan was established, one man might be forced by the delinquency of the foreman of an earlier shift to spend his shift preparing coal for the next shift to load out, and his output accordingly would be small. If a coal cutter breaks down we lay a loading machine idle so that the next shift boss will have a fair run of places ready to work. We may lose tonnage in the shift in which the disablement occurs, but we find even that pays in the long run, as it prevents an injustice.

"We take the rookies to a machine on the surface, show them just what happens when they throw certain switches. It is as necessary to train a man if he is to run a loader as it is to teach a novice if he is to handle an automobile. The machine runner needs to know what will happen if he places the machine up against a load it cannot lift."

Successful Mining Methods

BECAUSE the top twelve inches of the Eagle bed is bony, laminated and of no value, and over it is 6 to 12 in. of drawslate which cannot be profitably supported, the Raleigh-Wyoming Mining Co. at the Edwight mines is cutting a 13-in. kerf to a depth of 8 ft. in the dirty coal with a Goodman track-mounted machine and later dragging out the top material which falls behind the cutter bar. The cutter bar stays in the required stratum and does not travel as would a thinner bar into the cleaner coal. When the worthless material has been entirely removed, the bottom 42- to 48-in. coal is loaded out, stated Carl Scholz, consulting engineer, Charleston, W. Va., in a paper read by T. M. McGuire, chief engineer, Carbon Fuel Co. The floor is a hard fireclay, the roof tender and the cover heavy. Though the Goodman machine has a 100-h.p. motor, only about 60 h.p. was required to operate it, because power need not be increased proportionately to thickness of kerf. Doubling the width of kerf does not by any means double the load. Headings are 14 ft. wide and rooms 26 ft. on 42-ft. centers.

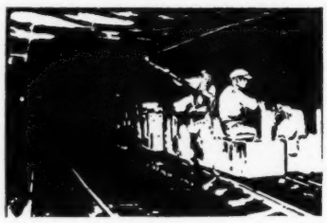
Where a heading has to continue in service six or seven years and needs support, it pays to protect it with gunite, for guniting will cost 10 per cent less than a so-called permanent timbering job, declared C. W. Jeffers, general superintendent, United States Coal Co. A machine for guniting that required 175 cu.ft. of free air per minute and 60-lb. pressure was put in the Crow Hollow mines. As much as 120 bags of cement has been used per shift. Sand and cement usually were mixed by hand at the job as needed, because if mixed more than an hour before use, the resultant gunite would be adversely affected.

Gunite Unit Costs $4,000

A tank that would supply water for 140 bags of cement was mounted on the truck. Each bag of cement required 2.8 gal. of water. The entire unit cost $4,000. Since it costs just about as much to load and unload material for guniting as for timbering, loading and unloading costs are not included in the calculation. Removal of timbers and scaling of sides and roof together costs 1.90c. per square foot; cement, 3.15c.; sand, 1.19c.; application, 2.62c., and power, depreciation and supplies, 0.58., or a total of 9.45c.

The sealing costs given probably are a little high for usual conditions, explained Mr. Jeffers, but Crow Hollow mine headings had been standing from three to twenty-five years. The mix of sand and cement was 3 to 1. Five to six men constituted a crew; the number depended on the height to which the heading had fallen. Holding the nozzle in high places is an exhausting job, so the men were changed around every hour; the nozzleman, when spelled, undertook other work with the crew. Three men mixed sand and cement, one man held the nozzle, and the fifth handled the gun.

Where there are drippers, they may carry away the portland cement before the latter has time to set, so holes were drilled in the leaky rock and pipes were set in the holes to carry off the water. Thus the rock was divested of free water sufficiently to permit of guniting around the pipes. Then the pipes were plugged, and a good job was obtained. Where reinforcement was necessary, 2-in. mesh material was used held by large nails in wood plugs or by expansion bolts. It was used only where there



was a soft surface, although probably even such a surface can be gunited successfully without reinforcement if later the gunite is carefully maintained. It may prove cheaper to omit reinforcement in such cases.

The main trouble, continued Mr. Jeffers, has been that the gunite will check; this is ascribed to the excessive shrinkage of portland cement. Air is always wet in the mine, so keeping the gunite wet would not reduce the checking. Because it is a slower setting material, natural cement, which gives excellent results in all kinds of work if given plenty of time to harden, was adopted. As a result, no surface cracks developed.

Condensation, especially where air enters the mine and where it forms into drops, has given trouble; here again the natural cement assists, for it does not absorb water like portland cement. Loss of sand and cement from rebound is reduced, and natural cement will cover a larger area than the portland brands.

Roof should be scaled immediately ahead of the nozzleman. In four or five hours, a freshly scaled surface will be ruined by weathering. The nozzle should be directed at right angles to the surface being coated and held not more than 3 or 4 ft. away. If the heading is too high, there will be excessive rebound. In applying a 1-in. coat in two layers, the first $\frac{1}{4}$ in. thick and the second $\frac{3}{4}$ in., a cement-and-sand mixture made the evening before was useless. The gun had to be cleaned every evening and given a completer cleaning every fifth day. With a dirty gun, good results cannot be obtained. At night, oil is poured in the bottom of the cleaned gun, and compressed air is admitted.

Goggles, added Mr. Jeffers, are essential, and sheet rubber for covering the trolley wire also must be used if guniting is to be done while trolley wire is energized. Guniting must not be confined to the heading but must be taken 2 ft. into crosscuts to afford the necessary protection for the edges of the work. With gunite, maintenance is important and every year it should be inspected and repaired. Even little cracks should be closed, for, if the air and moisture penetrate the lining, major trouble is inevitable, but, after all, it is no more expensive to maintain gunite than it is to clean up timbered headings.

Not too-rapid setting but drying was the cause of the checking of Mr. Jeffers' gunite, declared a critic from the floor. If he had duly sprayed his roof before guniting, he would have obtained good results. It is useless to expect gunite to resist the weight of "heavy ground" unless the concrete is well reinforced.

Gunite Holds 20 Years

One of the Clearfield Bituminous Coal Corporation mines has a fireclay roof, which was gunited 20 years ago, observed T. F. McCarthy, general superintendent; much of the gunite is still in place. A mixing machine was used and the mix sacked; thus protected, there was no trouble in keeping the mixture from deterioration, but there was trouble with static electricity whenever the sand was too dry. Both layers were $\frac{3}{8}$ in. thick; they knitted together well.

Without the crossbarring and posting system used in those mines of the Union Pacific Coal Co. having the most treacherous roof, it would be impossible to mine the coal at all, asserted George A. Brown, mine superintendent (see *Coal Age*, November, 1938, p. 48). Crossbarring is used only in territories where experience showed that the roof would spall around posts. Judgment as to the type of timbering to be used was left to the supervisory force. The State inspectors did not prescribe any system. No "specialists" were employed, but every man assisted in the work as he was able to find opportunity. There were five men to a crew, who were described as a machine operative, a duckbill operative and three face men, though their duties are not definitely prescribed. As an average for over a year the production per man in a crew was 13.3 tons. In advancing it would be 18 to 20 tons per man, but, in retreating the pillars, the output declined so that the average was as he stated.

System, said Jerome White, chief engineer, Hanna Coal Co., is the first order of life. For safety and efficiency the first necessity is for the super-

visory force to know its job and devise suitable methods. The second is to teach others and to stay and be patient with them until they understand the method; finally, the method thus determined must be enforced. Know, teach and enforce are the three principles of industrial management which Mr. Brown had recognized and put in operation.

To Dr. J. J. Rutledge, chief mine engineer, Maryland Bureau of Mines, it seemed that no roof was worse than that over the crushed pillars in the Frostburg (Md.) region, and yet the largest company in that district had the lowest accident rate in removing these same pillars. Systematic timbering is the solution for economic mining as well as for safety.

Fine Points in Preparation

THAT minor differences, such as quantity of refuse in coals from two mines in the same seam, call for different types of plants was stressed by P. D. Everly, superintendent of preparation, Island Creek Coal Co., in describing the 500-tons-per-hour No. 1 plant—the fifth built at Island Creek in the last few years. Experience with the first four plants and large-scale tests by shipping coal from one mine to the cleaning plant of another resulted in selection of a combination wet and dry plant using Roberts & Schaefer hydroseparators on 5x¼-in. coal, a Jeffrey three-compartment jig to reclaim coal from the primary refuse, and Stump air boxes to clean the ¼x0-in.

Smaller sizes of washed coal are dried by air heated to 590 deg. F., forced through a bed passing over a Marcus screen; moisture is reduced from 5 to 6 per cent to less than 2 per cent. Fuel requirement is 8 to 12 lb. of dried coal per ton of dried product.

Primary screening, picking and classification screening are done on a Marcus unit 18 ft. wide and 85 ft. long. Primary and secondary sections are each 6½ ft. wide and there is 5 ft. of open space between for pickers' stations. The plant includes provisions for optional handling and treatment of soft coal, and facilities for crushing any size and remixing or blending to any proportions. Dust from the Stump boxes, Tyler screens and various transfer points and conveyors of the plant is collected in a Pangborne dust collector.

4½ Per Cent Preferred

While the Stump air-flow units at the Champion No. 6 plant of Pittsburgh Coal Co. at Negley, Ohio, can handle raw coal carrying 6 to 7 per cent moisture with little loss of efficiency, best results are secured at 4.5 to 5 per cent moisture, declared D. H. Davis, chief chemist, and V. D. Hanson, assistant preparation manager. There is small loss of 1.60 sp.gr. float coal in the refuse. Design and construction of these units—consisting of perforated deck, slope 2¼ in. per foot and set over a pack of clay marbles 8 in. thick at feed end and 3 in. thick at the discharge end—were changed materially after the original installation. Widths were increased up to 6 ft.

The air equipment cleans minus ⅜- or 5/16-in. coal; its installation grew out of an increase in the ash content of minus ⅜-in. material after construction of the original plant, which was set up, explained Mr. Davis, on the basis of hand-picking plus 4-in. coal, Rheolaveur laundering of 4x⅜-in. material and bypassing minus ⅜-in. fines. The plant was designed to handle 325 tons of mine-run coal per hour.

Three primary units operating in parallel and one secondary or recleaning unit constitute the air plant. Clean coal from the primary units comprises 75 or plus per cent of the original raw-coal feed. A combined refuse and middlings product from the primaries is, in the usual cycle, put over a middling screen (5/16-in. when the feed is minus ⅜ and ¼ or 5/16 when the feed is 5/16) and the oversize sent to the Rheo and the undersize to the secondary Air-Flow cleaning unit.

Dust-Collecting Units

Dust collection consists of four 8-ft. (diameter) cyclones, which drop the coarser dust, and a Blaw-Knox four-in-one flat-roof bag collector removing the fine dust from the cyclones' exhaust. Use of several small cyclones instead of one or more larger ones results in a bag-collector product showing 98 per cent minus 200 mesh.

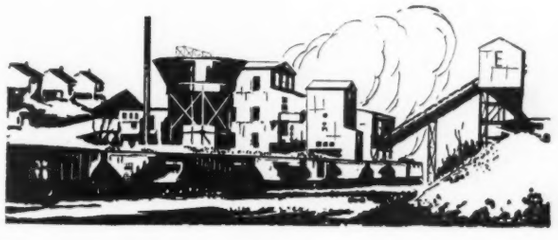
Vortex controls are used on both pressure and exhaust fans. Butterfly dampers were replaced by three-part louver dampers to improve air distribution to each cleaning unit. Zoning plates with elongated holes were replaced with wire cloths having openings from 1½ to 3 in. square. Rotary valves with positive and variable speed control were installed for discharging the refuse in place of gates which had been operated by air pressure under the marble pack.

Experience demonstrated that results with the air cleaning depend largely upon close regulation of all factors such as feed and air flow. Test results on three coals from the same seam indicated that results are a function of both tons per hour and size of the raw coal. As compared to an efficient wet cleaning plant in which it is possible to reduce the 1.60-sp.gr. sink in ⅜x48-mesh size to 1 per cent, an efficient air plant's cleaning is principally above 14-mesh. Furthermore, a better separation is made in the plus 8-mesh than in the plus 14-mesh.

94 Tons Dried Per Hour

Drying 94 tons per hour feed of ¾-in. x½-mm. washed coal containing 17 per cent total moisture requires 1,000 lb. per hour of dried coal fuel and 115 kw. of power, stated Otis Bledsoe, chief engineer, Binkley Mining Co. of Missouri, in describing the installation of two McNally-Vissac dryer units, each having 100 sq.ft. of exposed screen surface. Furnace gases at 700 to 1,100 deg. F., depending on desired moisture content, are passed down through a bed of coal moving over a wedge-wire drainage screen. Rapid oblique motion of the deck loosens the coal bed but suction of the air beneath compacts it. Controlled intermittent application of suction pressure to the two sections of the dryer results in cycles in which the moisture is first squeezed out of the coal and then evaporated by heat as the air passes through the loosened bed. The intermittent air application is effected by a pulsator, a patented rotating baffle at the beginning of the inlet duct to the respective Clarage Type I induced-draft fan. Each fan is rated 38,000 c.f.m. at 6.5-in. water gage static pressure.

In the 30,000,000-B.t.u.-per-hour stoker-fired Reintjes furnace, furnace gas is tempered by allowing excess air to enter through holes in the furnace walls, thus tending to hold the refractories at lower temperature. Variations in coal-bed depth which affect gas flow act through a controller and Modutrol motors to move louver dampers in the main flow and cold-air inlet to properly control the amounts of tempered furnace gases and cold air and also total heat content for



the amount of drying required. The coal is in the drying unit for approximately 40 seconds.

Normal drying at 800 deg. F. results in 12.5 per cent moisture content in the ¾-in.x½-mm. size and in 13.5 per cent in 1¼-in. screenings when the former has been mixed with 1¼x¾-in. size to form the screenings. Bed moisture of the coal as mined is around 12 per cent. Coal temperatures from the two units are 141 and 148 deg.

Cashing In on Maintenance

TWO PHASES of maintenance were highlighted at the technical sessions of the Cincinnati convention. The importance of careful inspection of equipment to eliminate needless delays in highly mechanized operations was stressed by Ernest Prudent, Bell & Zoller Coal & Mining Co. Oxyacetylene and electric welding for equipment repair was the theme of a paper by D. N. Smith, assistant superintendent of maintenance, Hudson Coal Co. This analysis of the place of welding in the anthracite region was supplemented by K. R. Bixby, general manager, Midland Electric Coal Corporation, who discussed the question from the standpoint of the bituminous stripping operation.

Every locomotive at the Bell & Zoller mines, said Mr. Prudent, is inspected at five-day intervals. When a locomotive is rebuilt, it is given a coat of protective paint, not because it needs it but because it then looks like a new machine, and this has a psychological effect on the motorman. He will be as careful in handling a newly painted locomotive as a driver will be careful of a shiny new automobile.

Experience in machine failures from a long record carefully kept determines the quantity of repair parts kept in the supply house. Efficiency of cutting machines depends on (1) proper preparation of the coal face, including removal of bug dust and proper drilling and charging; (2) sufficient power, (3) careful operation, (4) proper maintenance and (5) close weekly inspections. At least as important as the service of the mechanical department is the handling the equipment receives at the coal face.

Since welding has been introduced, worn, cracked or broken machine parts no longer are sent to the scrap heap but are repaired for further service, declared Mr. Smith. Shaker pans frequently break near their ends and can be so welded to other pieces of pan that they will continue to be of standard length. Lugs also are welded to pans rather than riveted, making a stiffer and more satisfactory connection. At Hudson Coal Co., which manufacturers its own troughs, one man always specializes in welding the male ends of the shaker pans and another in welding the female ends, so if any bad work is detected, the workmen who did it can be held accountable.

In the anthracite region, sprags are used for the control of mine cars and, as the cast-steel wheels used by Hudson Coal Co. have seven spokes, they soon develop seven flat points in the threads of each wheel. These are brought back to the correct radius by welding, using Roebling self-coated electrodes. As soon as one flat is built up to standard, the wheel is turned in the jig for welding the next flat. Thus far, no wheels have been broken by the expansion resulting from the unequal heating of the wheels when being welded. Cost of truing is 86c. per wheel. Wheels were not ground after welding, because to do so would remove the hard metal on the surface of the weld. Of course, care must be taken to prevent placing so much welded material as to make the wheel diameter excessive.

The teeth of even manganese crusher-roll segments soon wear in operation. They can be repaired by welding, but forms have to be used. A new segment will cost $64 but an old segment can be repaired for $20 and be made to serve the same purpose. Bronze casings of centrifugal pumps are being replaced in the shops by casings of stainless steel, added Mr. Smith.

Electric arc-welding, according to Mr. Bixby, has become an indispensable part of the coal-stripping industry. "This is particularly so when it comes to the repairs of broken and worn parts for our large electric stripping shovels. Some of these castings are so massive and the use of the shovels is so vital to the operation of the plant that it would be impracticable to remove them and return them to the fatory for repair. In many cases it would take several days to replace one of the large parts; so, where it is possible, they are repaired while in place by the use of the electric arc or oxyacetylene welding."

Responsibility for Safety

COMPLIANCE with safety rules is a joint responsibility of mine management and employees, declared J. J. Sellers, vice-president, Virginia Iron, Coal & Coke Co., in opening the session on accident prevention. At the mines of his company, rating the safety condition in each section by percentage has produced remarkable results in improving conditions and keeping the foremen alert. A relative weight or seriousness is assigned to each feature or point which an inspection should cover. Take timbering for instance: just for illustration assume it has been assigned a relative weight of 50 points. If on the inspection report it is checked as bad in two working places and 18 places were inspected, in columns on the sheet at the end of the line pertaining to timber are entered 900 (50x18) points possible and 800 (900 minus 2x50) points awarded. At the bottom of this sheet covering all items, the columns of points-possible and points-awarded are totaled and the "percentage of proficiency," as Mr. Sellers chooses to express it, is calculated by division then multiplication by 100.

Mr. Sellers also made a brief progress report as chairman of American Mining Congress Coal Division Safety Committee. Some time ago eighteen fundamental safety rules were promulgated; now the committee has just completed and submitted for final action a set of detailed safety rules. The work to date covers what was decided upon as the biggest job of fourteen objectives outlined at the first meeting of the committee in 1936. The remaining thirteen points to be dealt with are: indorsement and approval of officials, executive safety committees, safety departments, local safety units, safety meetings, education and instruction, physical examinations, discipline, responsibility, safety clothing, cooperation, illumination and dust health hazard.

The real responsibility for a lack of cooperation usually lies with the management, stated C. J. Flippen, safety director, Fuel Department, Norfolk & Western Ry. The task requires a knowledge of human nature; it is human engineering, not mining engineering. Psychology must be applied at every turn.

First, all matters in the way of complete understanding must be removed. Men must be known "one by one and known well." Mr. Flippen believes in disseminating information direct by open meeting so far as possible instead of passing it down the line, whereby it is likely to become distorted. Employees must be considered both as a single group and as individuals. Particular attention must be given to removing opposition by the so-called resistive groups. As to mine officials, Mr. Flippen finds there are two classes, promoters and caretakers, and there arises the problem of working the two together to the best advantage. The thought should prevail that all share responsibility in both good and bad results.

MECHANIZATION PACE SETTERS

+ A Review of the Latest Developments in Equipment, Supplies and Services for Modern Coal Mining Shown at

THE
16TH ANNUAL EXPOSITION OF
MINING EQUIPMENT

AMERICAN MINING CONGRESS

Harris & Ewing

FRANK E. MUELLER
New chairman of the Manufacturers' Division,
American Mining Congress

KEEPING STEP with the growing pace of mechanization in the coal industry, nearly 150 manufacturers and service organizations presented new and improved products for coal mines, shops and preparation plants at the 16th Annual Convention of Practical Coal-Operating Men and National Exposition of Coal-Mining Equipment, held at the Music Hall, Cincinnati, Ohio, April 24-28, under the auspices of the Manufacturers' Division of the American Mining Congress. Frank E. Mueller, vice-president, Roberts & Schaefer Co., was elected division chairman for the coming year, succeeding Roy L. Cox, vice-president in charge of mining sales, Jeffrey Mfg. Co. Arthur S. Knoizen, sales manager, Joy Mfg. Co.; E. J. Burnell, vice-president, Link-Belt Co.; and E. F. Carley, manager, explosives division, E. I. du Pont de Nemours & Co., Inc., were chosen vice-chairmen.

THE PIONEERING spirit again was evidenced at the exposition by such developments as placing drills, rock-dust distributors, compressors, loading machines and other equipment on rubber tires, following the initial use of rubber-tired haulage equipment in 1936. And the impact of mechanization was felt not only in mining and transportation, including new transfer cars and conveyor systems, but also in better electrical service at and behind the face; improved materials, supplies and maintenance equipment for more efficient operation with fewer interruptions; new types of safety equipment, such as methane alarms and conveyor-type rock-dusters; and—with changing consumer ideas—new preparation equipment, including stoker-coal crushers and new screens for sizing mechanically loaded coal. For a review of these and other developments, turn the page.

Cutting and Drilling Equipment

Loading Machines

Air Reduction Sales Co., New York—Hard-surfacing of both standard and patented double-ended cutter bits.

Barber-Greene Co., Aurora, Ill.—Standard 8-ft. section of belt conveyor for underground service. This low-type unit, used for mother and room service, is declared to be strong but light and is fitted with 4-in.-diameter ball-bearing idlers and removable deck plates. The sections are connected quickly by simple clamps without the use of bolts.

Bowdil Co., Canton, Ohio—*Bowdil* cutter bars, chains and bits; Cincinnati electric coal drills; picks and drilling equipment with throwaway bits or points.

L. M. Brown, Inc., Homestead, Pa.—New "Super" bit-forging machine (Fig. 1) made up of a forging machine proper and a heating furnace of the pusher-bar type with magazine feed; also "Super" Cesco Diamond self-hardening cutter bits. Forging machine and heating furnace are completely integrated so that passage of bits from one to the other is coordinated automatically. The furnace is constructed of Carborundum refractory and non-spalling Varnon firebrick, with Armstrong insulating brick for insulation. It is oil-fired and has a fuel-oil pump to reduce the fire hazard. The pump, equipped with an oil strainer, is integrated with a self-contained air-turbine blower.

The new forging machine, according to the company, places forging of bits on a production basis while at the same time assuring uniformity as to both bit size and shape. One lever controls the forging action, making the unit semi-automatic. The machine, it is stated, enables the average blacksmith shop to turn out 420 bits an hour when making new ones, or 600 bits an hour when redressing worn bits. A further advantage cited for the machine is its ability to forge high-alloy steels too tough for hand work or shaping by other types of machines.

"Super" Cesco Diamond self-hardening mine bits are made from tool steel of the same name with a hardness of 62 to 64 Rockwell C and consequent high resistance to abrasion. Extreme toughness is another characteristic cited for the material, reducing bending and breakage. Bits made of this steel may be redressed 120 to 140 times without loss of efficiency, according to the manufacturer. Four to eight times the cutting power of ordinary carbon steel is another claim for the self-hardening type, along with a reduction of 18 to 30 per cent in power consumption. The self-hardening feature saves time and labor, while tipping, said to average $8.75 per thousand bits, is unnecessary, the company contends.

Bucyrus-Erie Co., South Milwaukee, Wis.—Photographic display of stripping and loading shovels and draglines; model of the 29-T blast-hole drill.

Chicago Pneumatic Tool Co., New York—Portable hand-held and mounted electrical coal drills in both open and approved types, rotary hand-held air-driven drills, one-piece "twisted-steel" augers, special auger cutting heads, a post head bringing the drill to within 3 in. of the top and bottom, the CP-32 45-lb. rock drill and other drilling specialties, including the new "Whippet" electric coal drill in both the open and approved types.

Weight of the open-type "Whippet" drill (Fig. 2) is 40 lb.; approved type, 43 lb. Loaded speed is 400 r.p.m. Major features include a self-releasing safety switch, self-contained switch element for quick, easy replacement; removable dead handle to permit getting to within 3 in. of the top or bottom, adequate cable strain relief, three-conductor cable providing a safety ground wire, totally inclosed dirtproof motor, gears and clutch at the top for better balance, built-in adjustable safety clutch which releases when the drill sticks and thus reduces motor burnouts, and an inclosed auger chuck which prevents catching clothes or fingers.

Cincinnati Mine Machinery Co., Cincinnati, Ohio—Cincinnati bit-making plant for making Cincinnati "Duplex" bits at the mine; also Cincinnati cutter bars and "Duplex" chains—both standard and thin kerfs—for all types of cutting machines.

Enterprise Wheel & Car Corporation, Bristol, Va.-Tenn.—Model showing mining with the Smith pit-car loader, consisting of one or more boxes with self-dumping bottoms pulled back and forth by head and tail ropes (*Coal Age*, February, 1939, p. 55).

Goodman Mfg. Co., Chicago—Type 360 track-mounted loading machine; conveyor equipment, including the automatic duckbill; pans in various constructions and with various types of fastenings; swivel and angle troughs, including a new 90-deg. angle trough equipped with swivel castings for easier operation—also available on other angle troughs; an improved-design ball frame; and the G-20 and new J-10 and H-12½-R reversible drives; as well as a line of cutting

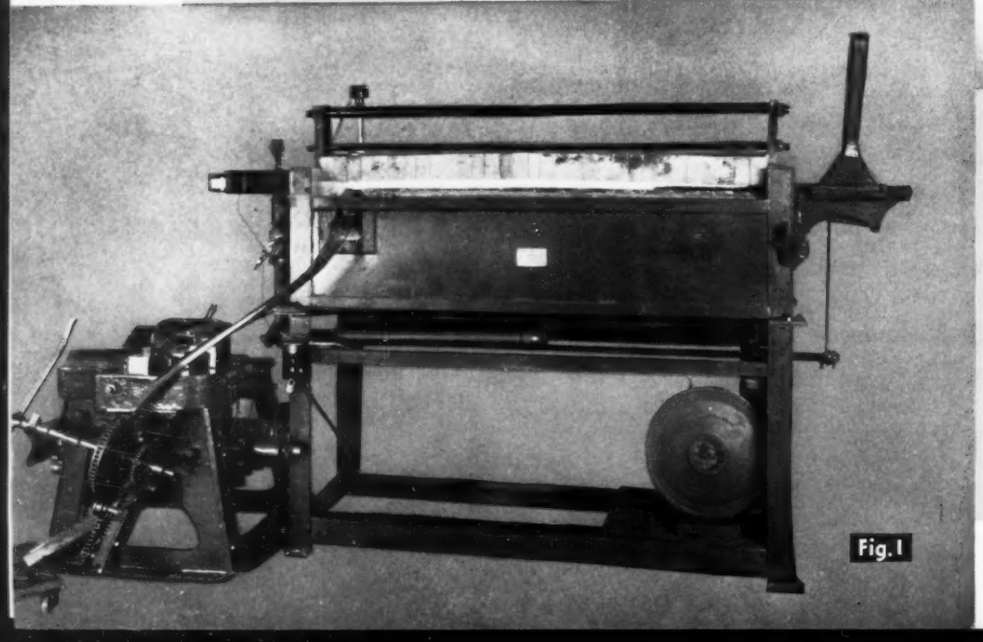


Fig. 1

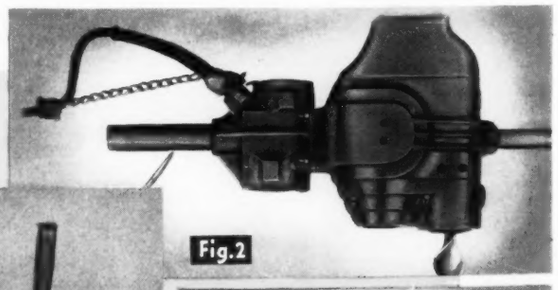


Fig. 2

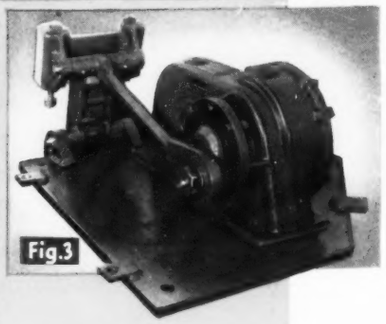
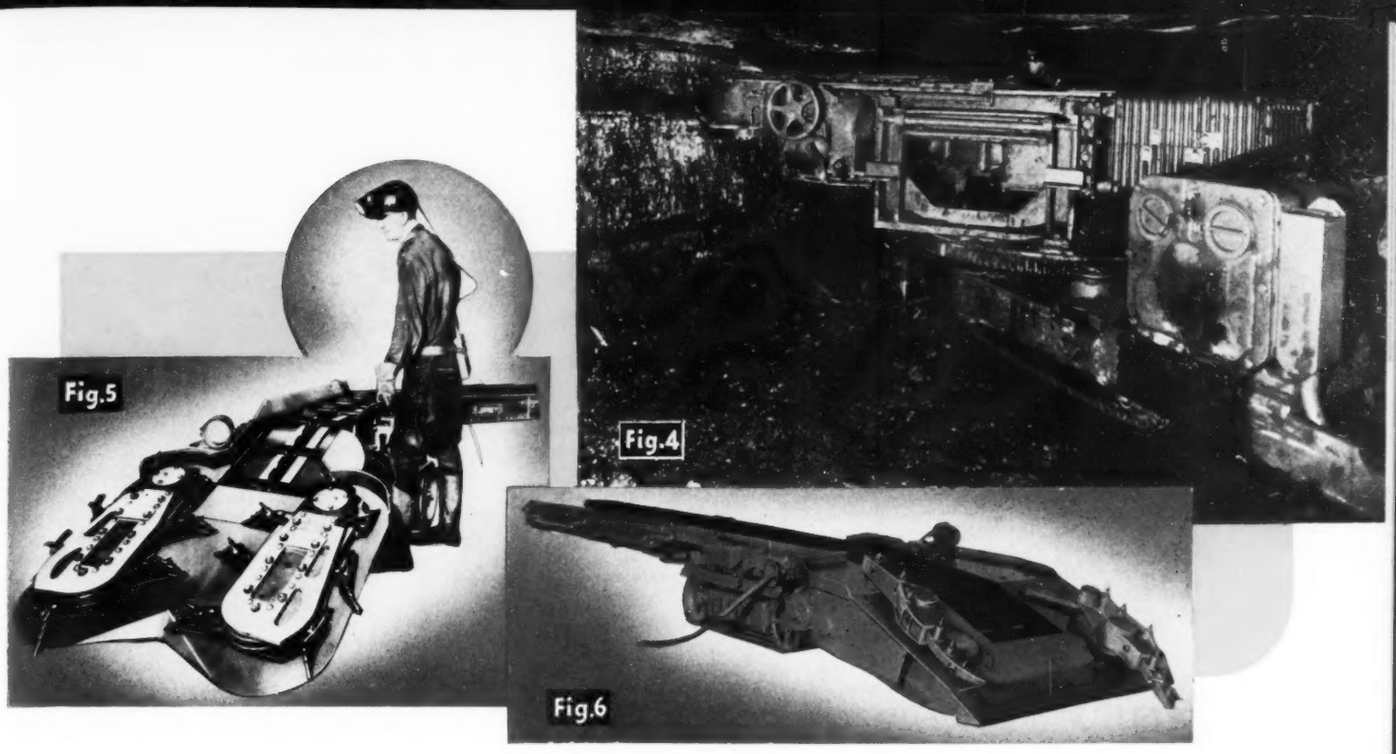


Fig. 3



equipment comprising the 412 low-vein shortwall with standard bar and chain, the 512 shortwall equipped with the Type 67 thin-kerf chain with Goodman throwaway bit, the 612 low-priced 20-hp. shortwall for conveyor mining equipped with the Type 64 standard-kerf chain and Goodman throwaway bit, and the Type 724-CJ "Gobber"—a specialized machine for the production of clean coal.

Goodman's new J-10 shaker-conveyor drive (Fig. 3) rounds out the company's line of small drives and is stated to be a low-priced unit which needs no connecting trough. In other words, it may be attached directly to the regular conveyor pans.

The new H-12½-R drive is equipped with an adjustment to permit the foreman or other authorized person to change the motions (A, B and C, either forward or reverse) whenever such a change becomes desirable, after which a locking device prevents unauthorized alteration. The drive also provides an AA motion forward for extreme grade conditions.

The 724-CJ Gobber offered by Goodman (Fig. 4) is distinguished by the following features: (1) a design permitting the use of twin cutter bars, if desired, for kerfs up to 20 in., with provisions for arranging for cutting in either the top or the center of the seam; (2) a conveyor attachment which permits the cuttings to be transported back from the face and loaded into a mine car or deposited in the gob; and (3) an unusually strong construction with a large horsepower rating for severe cutting conditions. The machine is designed for working coal beds containing impurity bands and offers a means of eliminating them by cutting. Specific uses noted by the company are: removal and disposal of drawslate, cutting between two benches of coal of different grades, cutting out and removing impurity bands, and cutting both above and below hard bands of rock or slate which cannot be cut directly.

Haynes Stellite Co., New York—Hard-surfacing of cutter bits with Haynes "Stellite" and "Haystellite" to increase life of points.

Jeffrey Mfg. Co., Columbus, Ohio—Type 29-U track-mounted cutting and shearing machine featured by predetermined setting of the volume control, after which the machine feed automatically is eased off when hard cutting is encountered. The setting can be changed at will and is designed to make the task of the machinemen easier; Type L-400 track-mounted loading machine; Type 61-AM room conveyor from its line of conveying equipment; Jeffrey "Star Bit" cutter chains; Type A-7 permissible hand-held coal drill with safety clutch; Type A-6 post-mounted coal drill; the new Type 35-BCS conveyor shortwall; and the new Type 61-CL conveyor loader on rubber-tired wheels.

The 35-BCS shortwall is equipped with a 35-hp. motor (d.c.) and is available in either the permissible or open type. It will accommodate cutter bars up to 7½ ft. long. With the thin-kerf bar, height is 24 in.; standard-kerf bar, 26 in. Length of the machine body is 56½ in.; width is 54 in.

Designed for operation in two rooms with a five-man crew, the new 61-CL conveyor loader (Fig. 5) deposits the coal on room conveyors. Rated capacity of the machine is 1 to 1½ tons per minute and it moves from place to place on rubber-tired dual wheels. Over-all height is 28½ in., and the side boards are removable for operation in very low coal, bringing the height to the coal line down to 25½ in. The loader, according to the company, can turn around in its own length, while the discharge boom, which can be lengthened by adding a section if desired, can be swung 45 deg. to each side of the machine center line. An 18-hp. motor serves as the main drive, while two 2-hp. motors handle tramming and maneuvering. Maximum length is 14½ ft.; over-all width is 54 in.; and the weight is 5,800 lb. The machine, the company states, can be used in headings and rooms from 12 to 35 ft. wide where the conveyor is laid in the center of the place. Also, it can be used to discharge onto a face conveyor in a wide place, although this may require a change in the face crew.

Joy Mfg. Co., Franklin, Pa.—Joy 11-BU caterpillar-mounted loading machine for thick seams, the new Joy 14-BU high-capacity loading machine for thin coal, and the new Joy electric coal drill. The 14-BU loader (Fig. 6) is described as a heavy-duty high-production machine with a capacity of 5 tons a minute for use in seams as low as 36 in. Control is fully automatic, with individual motors totaling 25 hp. for the gathering arms, caterpillars and pump. Specifications include the following: total weight, 13,000 lb.; height, 26 in.; width, 6 ft. 2 in.; length, 24 ft. 1 in.; maximum reach of gathering arms, 7 ft. 2 in.; and width of conveyor, 24 in.

The new Joy hand-held drill is designed for drilling 1¾- to 3-in. holes up to 9 ft. in depth and is featured by a stationary tube inclosing the auger. Results are safety and an absolutely straight hole, it is stated. Cuttings are conveyed back through the tube and are dumped into a sack or onto the floor. Weight with a 6-ft. auger is 62 lb. and the drill easily may be assembled or disassembled with only one wrench, it is pointed out. Carboloy bits are used, with a pilot bit rotating in one direction and a cutting bit rotating in the other, thus eliminating throwing or kicking of the drill.

LaDel Conveyor & Mfg. Co., New Philadelphia, Ohio—Sections of its other types of belt and chain conveyors and the U-12 shaker conveyor with new reversible side-arm drive (Fig. 7). The new construction, it is

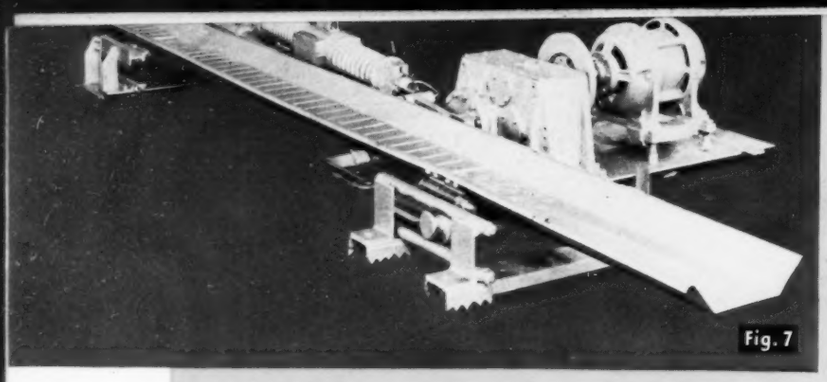


Fig. 7

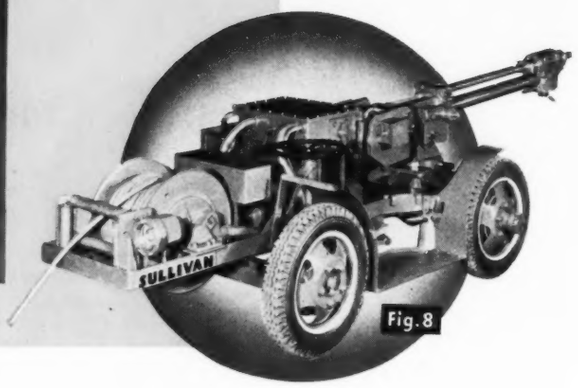


Fig. 8

pointed out, brings the entire conveyor line, including that passing the drive, down to within a very few inches of the mine bottom. The reversible feature permits running supplies to the face.

Link-Belt Co., Chicago—Link-Belt draglines and shovels and the Link-Belt stacker for reducing the cost of handling overburden in strip pits. With capacities up to 500 cu.yd. per hour, this crawler-mounted unit with an effective horizontal reach of 250 ft. permits the use of a smaller shovel which needs swing but one-quarter of a revolution. Automatic leveling is a feature of the machine, which is designed for material containing pieces normally running less than 30 in. in size.

Marion Steam Shovel Co., Marion, Ohio—Marion stripping and loading equipment in photographs.

Myers-Whaley Co., Knoxville, Tenn.—Whaley "Automat" track-mounted coal-loading machine with parallel-lift rear conveyor.

Frank Prox Co., Inc., Terre Haute, Ind.—Cutter chains and cutter bars, including the Prox "TooLSteeL" double-action bit and chain.

Sullivan Machinery Co., Claremont, N. H.—Improved "Super" shortwall cutter, "Master" thin-seam shortwall, 7-AU track-mounted cutting and shearing machine and examples of its line of coal- and rock-drilling equipment, including the new Sullivan "Auto Drill" for trackless mining. Using substantially the same mechanism as in the company's previous track-mounted and machine-mounted drills, the "Auto Drill" (Fig. 8) is mounted on rubber tires for rapid and convenient movement over the floor and positioning at the face. Construction features noted by the company include: front-wheel drive, short wheelbase, proved steering, mechanical hand and foot brake, variable-speed drum-type controller for traveling, welded chassis, mechanical locking device on boom, self-winding cable reel, automatic feed control and government-approved construction.

The drill is powered by a 3-hp. drilling motor and a 10-hp. traveling motor, the latter providing a speed of 5 m.p.h. Drill feed length is 5½ ft.; weight is 6,300 lb.; over-all length, 16½ ft.; chassis length, 10 ft. 8 in.; over-all traveling height, 44 in.; over-all width, 74 in.; wheelbase, 72 in.; and gage, 57 in.

Track and Trackless Haulage

Hoists and Track

Air Reduction Sales Co., New York—Welding of rail tracks and fabrication of frogs, etc., including joining of rails with R.R. rod, oxyacetylene welding; No. 27 bronze, oxyacetylene welding; and No. 78 electrode, electric welding, at a stated cost of about $3 per joint, 70-lb. rail; also building of a No. 3 45-lb. frog with No. 10 "Radiagraph" at a cost of about $10.

American Car & Foundry Co., New York—Complete line of mine-car wheels of various types made by the A.C.F. heat-treating process; welded-end-sill double-action spring bumper for all types of mine cars; and a new maximum-capacity all-welded drop-bottom mine car with snake-rod door latches for 3:2:1 or 1:2:3 opening, double-acting spring bumper and wheels of special A.C.F. mixture. Over-all length of the car is 12 ft. 1 in.; width, 6 ft. 7½ in.; height over rail, 25 in.; gage, 48 in.; wheelbase, 38 in.; level-full capacity, 79 cu.ft.; weight, 3,800 lb.

Bethlehem Steel Co., Bethlehem, Pa.—Mine-car wheels, forged links and pins; motorized mine-car chassis showing action of hydraulic brakes, steel ties, Koppers "Ar-moored" combination steel and creosoted wood ties, No. 1217 switch stand, No. 289 manganese frog, switch point with spring toggle to eliminate gapping where no switch-stand is employed; and a No. 393 turnout, 40-lb. rails, with malleable-iron heel blocks, new all-welded steel ties, No. 1201 switchstand and a reflector target showing switch position placed on the same side as the stand.

One of an order of 800 mine cars for a coal company was an additional feature of the Bethlehem exhibit. These cars are fabricated of Mayari-R light-weight corrosion-resisting steel and with a height of 27 in. and a water-level capacity of 108 cu.ft. weigh 300 lb. less than if made with carbon steel.

Bowdil Co., Canton, Ohio—Spike bars and other track tools.

Brown-Fayro Co., Johnstown, Pa.—"Brownie" rerailers for 20- to 60-lb. rails, Model TRE chilled cast-iron track rollers with "sealed" ball bearings, Model TRF rubber-covered track rollers with "sealed" ball bearings, Model RD electric car retarder with "Thrustor"-operated brake and motor rewind rated at 12,000 lb., Model HGD conveyor auxiliary hoist for dragging conveyor sections and supplies up to the working point and the Model HKL car-spotting hoist (Fig. 9). For low seams, the HKL hoist has an over-all height of 24 in. and a rated rope pull of 6,000 lb. at an average speed of 25 f.p.m. The unit is powered with a 5-hp. motor and weighs 2,275 lb.

Carnegie-Illinois Steel Corporation (subsidiary of the United States Steel Corporation), Pittsburgh, Pa.—Wrought-steel wheels, including a new light-weight unit, steel rails, steel mine ties, and a U.S.S. "Cor-Ten" steel mine car, showing how this corrosion-resistant steel can be welded and how the wheel hoods can be formed of a single piece of "Cor-Ten."

Differential Steel Car Co., Findlay, Ohio—Ten-ton "Axless" steel mine car used at the Isabella mine (*Coal Age*, July, 1938, p. 57) and the new Differential "Axless" mine locomotive (Fig. 10) equipped with four motors and designed to operate safely at speeds up to 30 m.p.h. Safe operation at high speed, according to the company, is made possible by the "Axless" truck drive, which consists of wheels driven in tandem. In other words, there is no connection between the wheels on one rail and those on the other, thus eliminating slippage on curves and retaining adhesion. A separate motor drives each of the four trucks on the locomotive, and an entire truck may be removed by disconnecting the motor leads, raising the locomotive frame and rolling out the truck.

Trucks have three distinct motions: (1) a swiveling motion about a king post for negotiating curves; (2) an oscillating motion in a vertical plane so that all wheels remain on the rails and equalize the loading when passing over rough tracks or low joints; and (3) an up-and-down motion of the entire truck on the springs. The combined effect, according to the company, is increased roadability with less wear and tear on track and wheels and decreased wheel loading, to which is added increased drawbar pull through elimination of slippage.

Enterprise Wheel & Car Corporation, Bristol, Va.-Tenn.—Low-type 20-in. high all-steel four-axle mine car with a level-full capacity of 69 cu.ft., as compared with 49 cu.ft. for the wheel-shield-type of car and 36 cu.ft. for the "mourner's bench" car; also a 28½-in. high four-axle all-steel 103-cu.ft. car with rubber-insert bumpers, spring drawhead and a stronger wheel design.

J. H. Fletcher & Co., Chicago—Rubber-tired haulage for coal from 30 in. up, featuring Fletcher automotive haulage equipment stated to result in low initial per-ton cost, low operating cost, flexibility and high efficiency.

Flood City Brass & Electric Co., Johnstown, Pa.—New car-spotting hoist in which a 30:1 worm-gear reducer replaces the old-style gear reduction normally furnished. Equipped with a 5-hp. motor, the unit, according to the company, provides a rope pull of 6,000 lb. at 35 f.p.m. The worm drive is non-reversible so that the drum is immovable when the motor is still. The unit is guarded at all points and is provided with a powerful brake mechanism and jaw clutch.

Gibraltar Equipment & Mfg. Co., St. Louis, Mo.—Light-weight tracklayer's and driller's tool cars with quick-acting safety brake, a complete assortment of "Gemco Tru-Blu" light-weight standard and ratchet-type rail benders for 8- to 120-lb. rail and standard and ratchet-type rail punches for 8- to 70-lb. rail, featuring a new-type ratchet; spike and leverage bars; the new "Gemco Tru-Blu" rerailers (*Coal Age*, April, 1939, p. 108), and the new "Tie-Lock" derailers and "Sure-Stop" stops.

The "Tie-Lock" derailers (Fig. 11), it is stated, are designed for exceptional strength with light weight by the use of "Gemloy" steel. In service, the unit is held in position by the rail and tie, and its features include low cost, no maintenance and ease of use. Stopping of the heaviest shock load with no possibility of failure is claimed for the "Sure-Stop" car stop (Fig. 12), also made of "Gemloy" steel. Easy spotting on the rail and easy removal in spite of how hard it is used are features of the new stop, which is said to lock tighter on the rail as the force of the blow increases. It may be removed without a man having to get his hand down on the rail or under the car wheel. Rerailers, derailers and car stops are available in sizes to fit rails from 8 to 90 lb.

Guyan Machinery Co., Logan, W. Va.—Light-weight mine inspection car (Fig. 13) with all-steel frame, ¼-in.-steel deck plates and 14-in. pressed-steel wheels. Available in gages of from 36 to 48 in., width varies from 41 to 53 in., while length is 70½ in. and height above the rail is 23 in. The car is powered with a 1-hp. motor and is equipped with a hand brake operating on the armature shaft. Speed is 5 to 6 m.p.h., and the capacity is four men or an equivalent weight. The weight, varying with the gage, is approximately 530 lb.

Joy Mfg. Co., Franklin, Pa.—New permissible Joy 32 D 1 3½-ton and 42 D 2 6-ton shuttle cars for rubber-tired mining. The 32 D 1 car (Fig. 14) is a low-vein unit with 6-in. side boards and a removable back for loading in low seams. Over-all height is 32 in. and weight with battery is 10,800 lb. Light traveling speed is 5 m.p.h.; loaded, 3½ m.p.h. A 4½-ton unit has a height of 38 in. and weighs 11,200 lb. with battery. Turning radius is 18 ft.

The 6-ton shuttle car (42 D 2, Fig. 15) has an over-all height of 48 in. and weighs 13,200 lb. with battery. Speeds are 5 m.p.h. empty and 3½ m.p.h. loaded. A 5-ton unit is 42 in. high and weighs 12,800 lb. with battery. Turning radius is 18 ft. 3 in.

Linde Air Products Co., New York—Oxyacetylene cutting of switch and frog parts with special cutting units.

Link-Belt Co., Chicago—Graphic presentation of skip-hoisting, dumping and slope-belt installations, and electric monitor systems.

Mancha Storage Battery Locomotive Co., Chicago—Battery locomotives in pictures.

Metal & Thermit Corporation, New York—Material and equipment for continuous welding of rail joints.

Myers-Whaley Co., Knoxville, Tenn.—The new Whaley transfer car (Fig. 16) designed to give mines with small cars the benefits of a large-capacity transportation unit behind loading machines. Equipped with a cable-reel and a 10-hp. motor, the unit shown has a nominal capacity of 5 tons, compared with an average of 4.7 tons mechanically loaded, or enough to fill two mine cars, which are loaded in trips on the entry. Loaded speed of the transfer car is 5½ m.p.h., and the speed of discharge of load is 10 tons per minute. The unit is equipped with a parallel-lift rear conveyor which is lowered while the car is traveling and is raised when transferring the coal to the mine cars. Because of the parallel-lift feature on the rear conveyor, only a limited amount of top need be shot down in low places to permit loading, it is stated. Conveyor length is sufficient to permit loading a car end on, and in that case cars may be loaded at

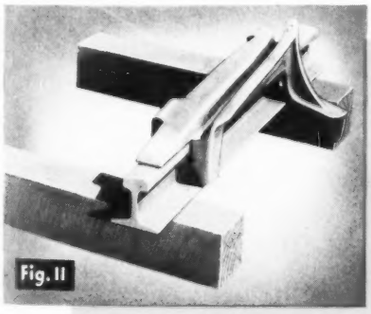


Fig. 11

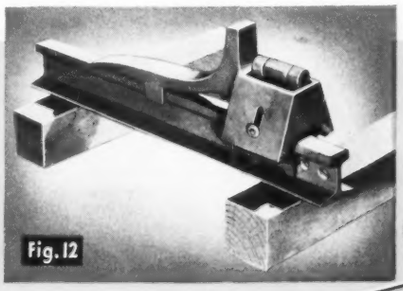


Fig. 12


Fig. 9

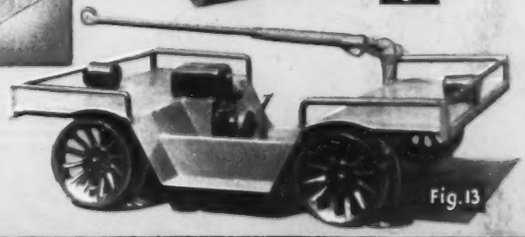


Fig. 13

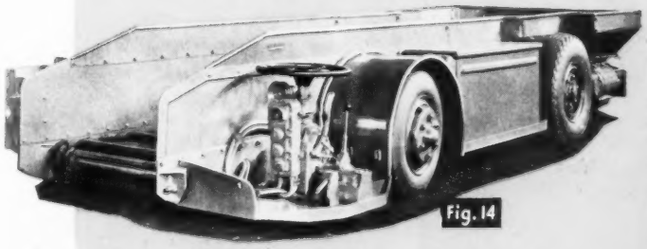


Fig. 14

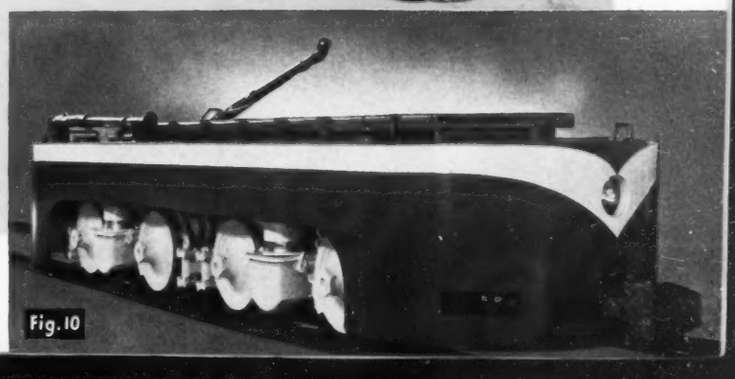


Fig. 10

any point between entry and face. And if used as a storage reservoir, the transfer car enables the loading machine to utilize all the time for loading if the cycle is properly balanced. The haulage crew remains the same with the transfer car, while an extra man is added to operate the car itself.

Time studies, according to the company, show a face economy of 7 to 8c. per ton with the transfer car, and on the basis of two-shift operation the cost of the transfer car will be returned in 5½ months; triple shift, 3.7 months. With an average room depth of 162 ft., it is pointed out, a 2½-ton mine car and locomotive travel 248 ft. per ton of coal loaded, compared with 72 ft. for the transfer car, reducing mine-car and locomotive maintenance charges. Power to operate the transfer car averages 0.014c. per ton at one mine, which is offset by the power required by a service locomotive (two 30-hp. motors). Loading on the entry, it is stated, raises car capacity from 2.25 to 2.35 tons, while operation of the transfer car raises loading-machine tonnage approximately 30 per cent. Cost of maintaining the transfer car is stated to be probably ½ to 1c. per ton, offset by the lower car and locomotive maintenance noted above.

Nachod & United States Signal Co., Inc., Louisville, Ky.—Demonstrations of "Nussco" automatic mine block signals, "Cessco" electrically operated switch-throwing devices, automatic derails, hydraulic spring switches, trolley contactors, rail contactors and other haulage specialities.

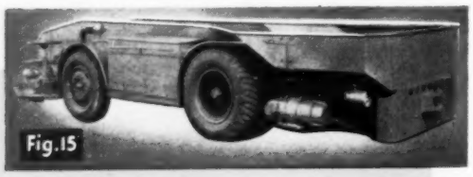


Fig.15

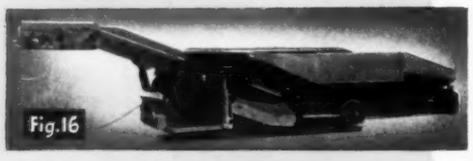


Fig.16

National Malleable & Steel Castings Co., Cleveland, Ohio—"Naco" cast-steel mine-car wheels, mine-car hitchings, friction draft gears, Willison automatic mine-car couplers and a combination coupler and draft gear with cast-steel draft-gear housing as used on cars at the Kopperston mine (*Coal Age*, March, 1939, p. 29; April, 1939, p. 71).

Ohio Brass Co., Mansfield, Ohio—New automatic coupler for mine cars (Fig. 17) differing from previous units in that rubber buffer pads, capable of absorbing blows up to 50,000 lb., are used instead of the conventional draft-spring construction. The couplers are of the male-and-female type and couple automatically upon impact on curves of short radius without manual adjustment or prior alignment, the company states. A self-contained self-centering device eliminates external centering-sling construction. The use of rubber buffer pads conserves car capacity and simplifies mounting of the coupler on the car, inasmuch as only a simple steel form is needed.

Portable Lamp & Equipment Co., Pittsburgh, Pa.—Safety derailers, holding and running skids (*Coal Age*, April, 1939, p. 107), transition rails, compromise rail splicers and the new track-signaling system employing reflector buttons to show switch position automatically (Fig. 18).

Sanford-Day Iron Works, Inc., Knoxville, Tenn.—Anti-friction mine-car wheels and wheel metal, sheaves and incline rollers, ball-bearing light-weight tool trucks, models of large-capacity rotary- and end-dump cars and its latest automatic drop-bottom car designed to fit in with present-day mechanization programs. The car was arranged to show automatic door opening and closing over a bin. Equipped with S-D "Floater" ball-bearing wheels, the car has a level-full capacity of 112 cu.ft. with the following dimensions: height over rail, 28 in.; width, 6 ft.; length, 12 ft.; gage, 42 in.

Sullivan Machinery Co., Claremont, N. H.—Room hoists and car pullers.

Tallman Mfg. Co., Shelbyville, Ill.—Complete line of light-weight "Talloy" aluminum rail benders in three sizes for 12- to 80-lb. rail; No. 40 (12- to 40-lb. rail) and No. 60 (12- to 60-lb. rail) "Talloy" light-weight rail punches; standard rail benders, including the Nos. 5 and 6 forged-steel screw-type "Chicago" units and the No. 4 cast-steel Samson-type bender for rail up to 45 lb.; Superior and Richtal car movers, track gages, etc.

The "Talloy" bender and punch display included the company's new ratchet operating mechanism, available on both the Nos. 40 and 60 punches and also on the rail benders for rails up to 30 and 40 lb. (Figs. 19 and 20). Easier and faster operation are emphasized in the case of the ratchet mechanism, which is available on both the "push"-type benders, as well as on the "push-pull" units.

Watt Car & Wheel Co., Barnesville, Ohio—Equalizer-type mine car (Fig. 21), termed the "latest in the four-wheeled type of car." The new car, it is stated, was designed to meet the problem of stability growing out of increasing car length without increasing wheelbase. On one side the car is carried on an equalizer unit consisting of two wheels in three yokes, the whole assembly sliding up into a tonneau. The three yokes and resultant three suspension points provide a short wheelbase and at the same time permit the loads to be suspended on bearing points near the end of the car—result, greater stability, it is asserted. On the opposite side of the car, each wheel is in a separate yoke, with one end of each yoke carrying a rubber pad bearing on the car body.

Webster Mfg. Co., Tiffin, Ohio—Section of heavy car haul showing chain construction for this service.

Weir-Kilby Corporation, Cincinnati, Ohio—Weir track and turnout materials and Weir "Titan" titanium- or manganese-steel frogs.

West Virginia Rail Co., Huntington, W. Va.—West Virginia sectionalized steel-tie turnout (December, 1938, *Coal Age*, p. 61), steel ties of all types, cast-manganese-steel frogs, safety frogs and "Quick" light-weight quick-action rail benders.

Wood Preserving Corporation, Pittsburgh, Pa.—Koppers "Ar-moored" combination steel and treated-wood ties for room and room-entry service.


Fig.17

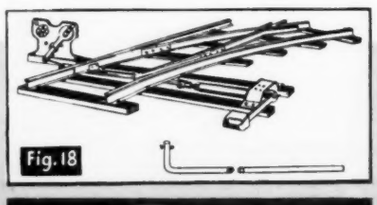


Fig.18

Fig.19 Fig.20

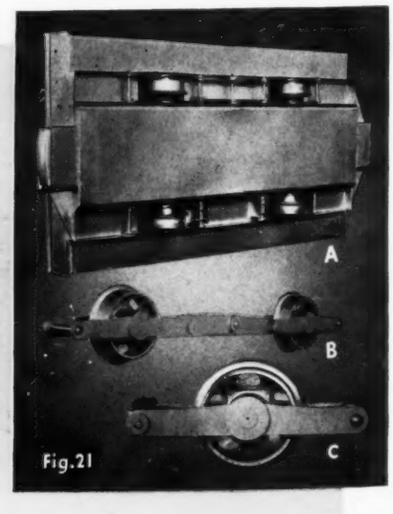


Fig.21

Coal Preparation and Utilization

Treatment of Coal

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—"Aero-Vibe" screen, Style B centrifugal vibrating screen and the new "Sta-Kleen" vibrating screen (*Coal Age*, April, 1939, p. 108) for low-head operation featured by a sub-deck and rubber balls for eliminating blinding.

American Steel & Wire Co., Chicago, —Graphic presentation of aerial tramways for refuse disposal.

Barber-Greene Co., Aurora, Ill.—Pictorial display of equipment for stocking and reclaiming coal, including portable conveyors and stackers fitted with full-revolving crawlers; also bucket loaders and drag-type portable units for loading trucks or conveyors.

Bituminous Coal Research, Inc., Washington, D. C.—Reports of the latest findings on the preparation and utilization of coal and equipment (Fig. 22) for the measurement of coal dustiness before and after treating with petroleum products.

Brown-Fayro Co., Johnstown, Pa.—Model 2F8 high-pressure oil-spray pump for dustless treatment of coal with cold petroleum products.

Central Electric Repair Co., Fairmont, W. Va.—Demonstration of magnet for removing tramp iron and steel from coal.

Deister Concentrator Co., Fort Wayne, Ind.—Deister-Overstrom "Diagonal Deck" coal-washing tables in pictures; new "Concenco" anti-friction-bearing head motion for coal-washing tables, "Concenco" spray nozzles and a Leahy vibrating screen with new "Tri-Vibe" feature said to insure positive distribution of the vibration over the entire area of the cloth, simplifying tensioning and increasing cloth life.

Deister Machine Co., Fort Wayne, Ind.—Coal-cleaning and screening equipment, including the latest-type "Plat-O" coal-washing table, stated to have 100 to 300 per cent greater capacity, and the recent heavy duty "Plat-O" vibrating screen (flat screening angle, high speed for elimination of blinding, extra-heavy construction and quick and easy changing of cloth).

Dustlix Corporation, Milwaukee, Wis.—Trademarking of coal both by automatic machines placing gummed labels in the coal as it is loaded and by hand on large coal (lump and block) using labels cut off a roll, supplied with a waterproof adhesive and ejected from the machine so that they are handy for a man to grasp them and apply them to the surfaces of the chunks. The machine may be set beside the loading boom or conveyor and the trademarks applied as the coal goes by so that they will be all through the car instead of on top.

Fairmont Machinery Co., Fairmont, W. Va.—Preparation products and services including erection of Chance sand-flotation coal-cleaning plants, tipples and other preparation facilities.

Gruendler Crusher & Pulverizer Co., St. Louis, Mo.—Displayed 100-tons-per-hour 60-hp. ring-hammer crusher for general mine-run crushing, one of a line of ring-hammer and roll crushers for all applications; also a laboratory coal sampler (Fig. 23). The latter unit is a combination of a hammer crusher and a splitter giving 16 or 32 separations. The crusher is driven by a 3- to 5-hp. motor and will handle up to 1,000 lb. per hour of material up to 2½ to 3 in. in size, breaking it to 1¼ in. and smaller and splitting it at the same time to one-sixteenth or one-thirty-second.

Hendrick Mfg. Co., Carbondale, Pa.—Ornamental grilles, perforated elevator buckets, testing screens and a general line of screening products, including new flanged lip screens for dewatering and an overhanging-type flanged lip screen for coarse-coal screening. The flanged lip screens for dewatering are available in various metals, usually stainless steel or bronze because of

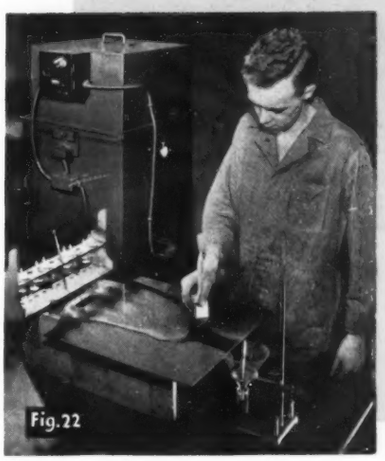


Fig. 22

their acid- and rust-resisting properties. The wedge-shaped perforations, it is pointed out, tend to reduce blinding, inasmuch as following particles tend to knock out any that might stick.

Designed primarily for coal over 4 in. in size, the overhanging-type flanged lip screen was developed, according to the company, to meet the problem growing out of the production of irregular-shaped pieces of coal in mechanical mining. The shape of the screen openings is such that if lumps tend to hang, those coming behind will knock them out.

Interstate Equipment Corporation, New York—Pictorial display of tramway installations as well as tramway parts removed after long service.

Jeffrey Mfg. Co., Columbus, Ohio—Belt, chain and apron-conveyor equipment, Jeffrey-Traylor electric vibrating feeder, Jeffrey Type 240-A capstan car puller with motor attached to make an integral unit, Jeffrey-Traylor vibrating "Conveyanscreen" with the new Heller piano-wire cloth, and the Jeffrey slow-speed "Flex-Tooth" crusher. The Heller cloth, according to the company, is available in any opening from 120-mesh to ¾-in., and in addition to plain is available in stainless steel. The cloth is installed in three panels, each of which can be had with different openings. Use of the piano-wire prin-

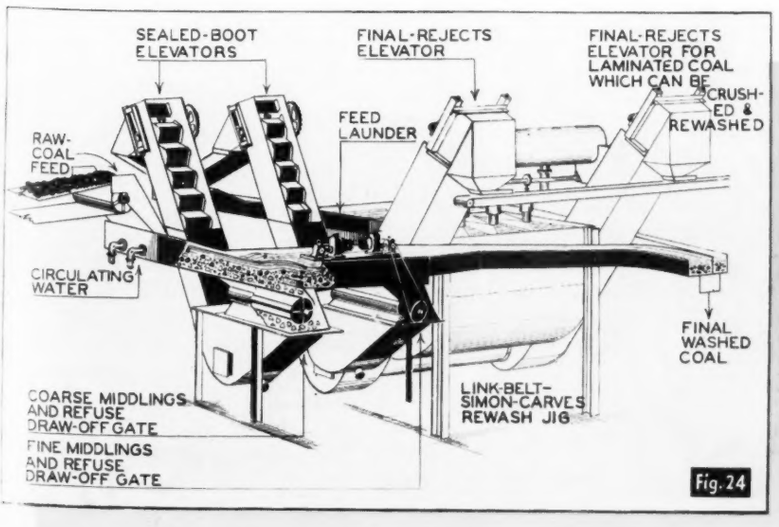


Fig. 24

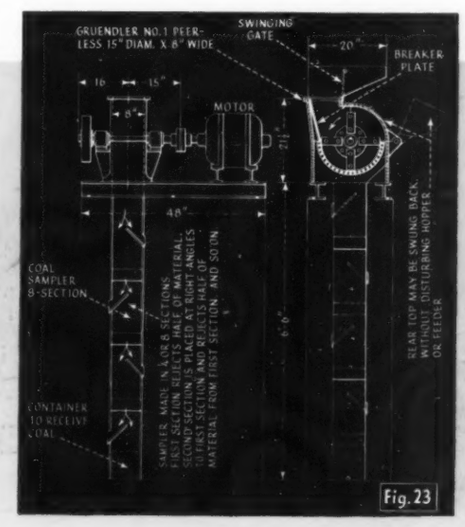


Fig. 23

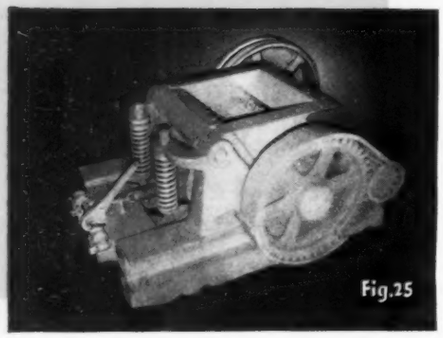


Fig.25

ciple, it is stated, provides a different playing action from regular wire cloth. The cloth is placed in the screen under five times the tension, and the cloth openings are across the flow of the coal. The open area is said to be 50 to 60 per cent greater than with wire cloth, while life is substantially greater, in addition to higher screening efficiency and practical elimination of blinding.

Slow-speed "Flex-Tooth" crushers are offered for reducing lump, egg, nut or mine-run to domestic-stoker size in one operation with a very small percentage of fines or oversize. Speed with 24-in.-diameter rolls is 300 r.p.m., compared with 450 r.p.m. before. Corresponding adjustments have been made in the cases of other roll sizes. Minimum headroom, automatic tramp-iron relief, low "Armorplate" steel frames, replaceable liners, hinged breaker plates in front and hinged cover plates in back for easy accessibility to working parts, built-in metal catcher and large bar-screen area are other features noted by the company.

Johnson-March Corporation, New York—"Coalaid" process of treating coal to eliminate dust, reduce degradation and prevent freezing.

Koppers-Rheolaveur Co., Pittsburgh, Pa.—Coal-preparation and shipping services, featuring the Koppers-Menzies cone separators and barge-loading.

Link-Belt Co., Chicago—Photographs, drawings, models and actual units to show its railroad-car dumpers, blending plants and paddle mixers, crushers, Link-Belt Jr. washer, Link-Belt "Roto-Louvre" dryer, Link-Belt Simon-Carves washing equipment, Link-Belt stokers and Minneapolis-Honeywell controls, and the new Link-Belt combination trough-and-Simon-Carves washer (Fig. 24).

In the combination trough-and-Simon-Carves-washer installations, the objective is to eliminate the purchase of more than one washing unit at large-capacity plants, thus reducing cost, taking up less space, using less power and reducing maintenance. The coal is fed into a trough where it stratifies into layers of clean coal and reject. Two rotary gates are installed under the trough, the first taking large heavy refuse and the second the remainder of the reject material. In taking out the reject a cut is made into the coal to make sure that what goes out of the trough is absolutely clean. The reject removed by the two gates then is run through a regular Link-Belt Simon-Carves washer for recovery of the coal, which joins that from the launder.

McLanahan & Stone Corporation, Hollidaysburg, Pa.—New Black Diamond all-welded-structural and cast-steel-frame SKF-roller-bearing crushers (Fig. 25) with one-piece hopper and fewer working parts, all said to be more accessible. In these crushers, the company points out, the three roll segments are held to the shaft by wedges and consequently are easily removed. Toggles for automatic tramp-iron protection have been placed directly back of the breaking plate where they are more easily accessible and out of dust and dirt, and are held in place by vertical compression springs. Adjustment of the opening over a 4-in. range is accomplished quickly while crushing by means of ratchet turning a worm and worm wheel, these in turn operating an adjusting screw which presses against the back of the toggles to move the breaker plate as desired. Other features are low height, long curved corrugated crushing plate, removable crushing tip, deep wide throat, special toothed rolls with circuit rings and a minimum of fines and flats.

McNally-Pittsburg Mfg. Corporation, Chicago.—Photos and diagrams to show the company's preparation equipment and services, including McNally-Norton vertical pick breakers, McNally-Norton automatic coal washers and the McNally-Pittsburg Vissac heat dryer.

Morrow Mfg. Co., Wellston, Ohio—Morrow-Prins coal washer with a capacity of 100 tons per hour.

Nordberg Mfg. Co., Milwaukee, Wis.—Symons vibrating screens and "Rod-Deck" screen (round steel rods across the direction of coal flow).

Pittsburgh Coal Carbonization Co., Pittsburgh, Pa.—"Disco" process for converting fine coal into a premium smokeless fuel for domestic heating by low-temperature carbonization (*Coal Age*, March, 1939, p. 45).

Productive Equipment Corporation, Chicago—"Selectro" vibrating screens in the preparation of stoker coal.

Roberts & Schaefer Co., Chicago—Preparation services and equipment, including the Menzies hydroseparator coal washer and Stump "Air-Flow" coal cleaner.

Robins Conveying Belt Co., New York—Photographic presentation of the company's preparation products and installations, conveyor idlers and a working model of a vibrating screen.

John A. Roebling's Sons Co., Trenton, N. J.—Screen cloths.

Shell Petroleum Corporation, St. Louis, Mo.—Treating oils of all types for dustproofing coal.

Simplicity Engineering Co., Durand, Mich.—New 5x12-ft. Model D double-deck positive-action gyrating screen said by the company to provide increased capacity and efficiency and eliminate blinding. Features include SKF heavy-duty roller bearings, "Rezlent" corner supports to prevent transmission of vibration, V-belt drive from a motor mounted directly on the frame and spring-action tensioning—said to give an accurate size opening at all times.

Socony-Vacuum Oil Co., Inc., New York—Spray oils for dustproofing coal.

Standard Oil Co (Indiana), Chicago—New "Standard vapor oils" series, described by the company as having a greater spreading or creeping tendency, thus giving better coal coverage and protection against absorption and loss of moisture, in turn stopping oxidation—a major cause of breakage and degradation. Higher viscosity is said to make the oils cling longer.

Stephens-Adamson Mfg. Co., Aurora, Ill.—Redler elevators and "conveyor-elevators"; Simplex belt carriers, a redesigned air-sand cleaner and a new crusher for making stoker coal. The redesigned air-sand unit (Fig. 26)

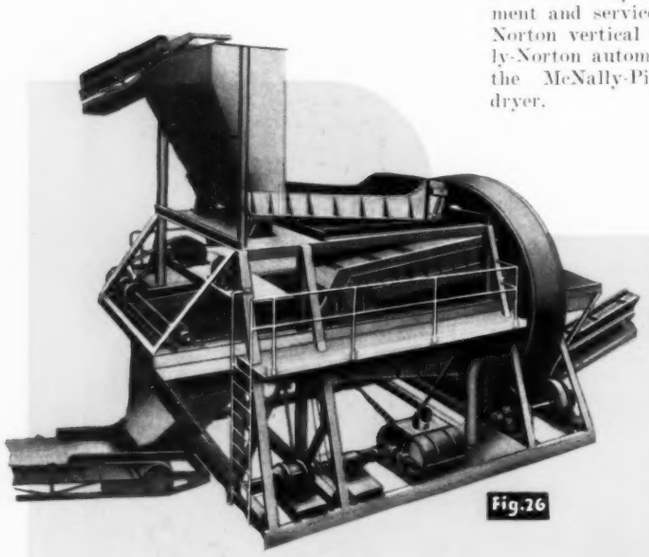


Fig.26

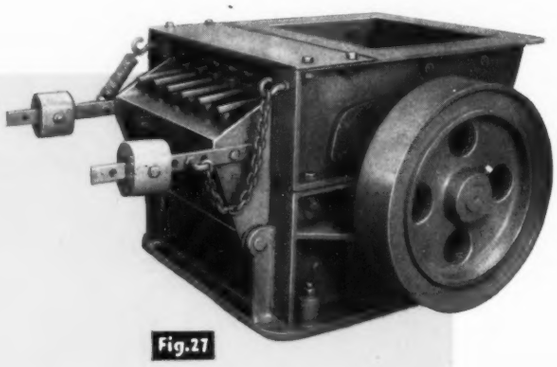


Fig.27

combines multistage operation and continuous cleaning of refuse in one unit and, according to the company, eliminates wet-coal troubles, offers large capacity in a minimum-size structure and includes the new launder-type separator and the revolving sand lift. With a 4-ft.-wide separator box and a 13½-ft.-diameter sand wheel, cleaning and recleaning capacity is given as 80 to 100 tons per hour. With a 6-ft. separator and 14-ft. wheel, capacity is 120 to 150 tons per hour, and so on.

The new crusher, of the ring type (Fig. 27), is built under the Knittel patents and, according to the company, is designed to crack, rather than crush, mine-run coal to stoker in one operation. The cracking action of this crusher, made possible, it is stated, through the use of triangular-shaped sectors, permits handling larger lumps for a given-size machine and minimizes the production of dust.

Streeter-Amet Co., Chicago—Streeter-Amet automatic weighing equipment, including special features, as follows: keyboard identification, visual totalization, combination records, zero balance, fully automatic printer control, governor and signal; progressive card-print feeder, outside tape feed, remote recording, remote indicating, beam lock and tamper-proof inclosure.

Sun Oil Co., Philadelphia, Pa.—"Coalkotes" of all types for dustproofing coal, including the new "Coalkoke CBO" in viscosities of 100, 200, 400 and 600 sec.

W. S. Tyler Co., Cleveland, Ohio—Type 400 electric vibrating screen for fine-mesh separation of coal and a "Ty-Rock" high-speed circle-throw screen floating entirely on rubber and designed for low-angle operation.

United Engineers & Constructors, Inc., Philadelphia, Pa.—Chance sand-flotation coal-cleaning process.

Webster Mfg. Co., Tiffin, Ohio—Webster coal-tipple equipment in photographs and belt-conveyor idlers—one featured by a lubricated-for-life bearing and the other by Alemite equipment for periodical greasing.

Motors and Controls for Mines Power Distribution

Louis Allis Co., Milwaukee, Wis.—Coal-mining electric motors, featuring a new line of a.c. and d.c. Bureau-of-Mines-approved units, splashproof motors and totally inclosed dustproof motors.

American Steel & Wire Co. (subsidiary of the United States Steel Corporation), Chicago—"Amerglas" insulated magnet wire for motors and generators, "Amerclad" electrical wires and cables, the new "Amerbestos A.V.C." cable for internal wiring of mining equipment insulated with varnished cambric and asbestos for 600-volt service, and a complete line of "Tiger-Weld" rail bonds, including newly developed types for temporary and permanent service.

Anaconda Wire & Cable Co., New York—Mining-machine and locomotive cables and other wires, cables and cords for strip- and deep-mine service, including "Sunex Securityflex" cable for voltages from 300 to 7,000 characterized by high resistance to cracking from heat or sun. D-shaped insulation, it is stated, prevents twisting and kinking and also facilitates making connections. Anaconda also stressed its borehole suspension units (Fig. 28) for hanging insulated or bare cables in boreholes from potheads at the top of the casing. No armor is required on the cable, it is pointed out, as the conductor has a special drawn terminal which will suspend weights up to the breaking strength of the conductor itself.

Bowdil Co., Canton, Ohio—Bryant "Choke Arc" transfer switches for mine locomotives.

Central Electric Repair Co., Fairmont, W. Va.—Field-coil tester.

Thomas A. Edison, Inc., West Orange, N. J.—Nickel-iron-alkali storage-battery cells for permissible mine locomotives, Edison electric cap and hand lamps.

Electric Controller & Mfg. Co., Cleveland, Ohio—Items from the new line of EC&M "Line-Arc" repeating sectionalizers for low-cost mine sectionalizing (*Coal Age*, March, 1939, p. 86), including: Form X—instantaneous-trip overload relay and static timing relay providing two seconds delay; one to six operations before relay is locked open; Form XL—similar to Form X except that a "Neo-Time" circuit is provided permitting time delay to be adjusted between 10 and 60 seconds to give more opportunity for clearing faults and also permit adjusting several sectionalizers on the same power circuit to reclose at different times; and Form XLP—same as Form XL with the addition of a bridging resistor to provide a "feeler circuit" to prevent reclosure if a fault still is on the line.

Electric Railway Equipment Co., Cincinnati, Ohio—Section insulators and switches, quick-break switches, trolley-line materials such as harps, wheels, insulators, splicers, hangers, trolley clamps, etc., and a complete line of feeder-cable suspension devices. Featured by the company was a new quick-break mine feeder switch, manually operated, characterized by a double instead of a single mounting to keep all parts in alignment when installing it. Another new item was a combination trolley and feeder switch mounted on hangers instead of wood and accommodating 4/0 and 6/0 trolley wire or 4/0 to 750,000-circ.mil feeder. The switch is a low-height unit of the quick-break type with a solid underrun. Also new was a trolley and feeder clamp of the "suregrip" and lock type fitted with a reversible plate for quick and easy installation of feeder wire. The unit accommodates 2/0 to 6/0 wire by turning clamping plate.

Electric Railway Improvement Co.,

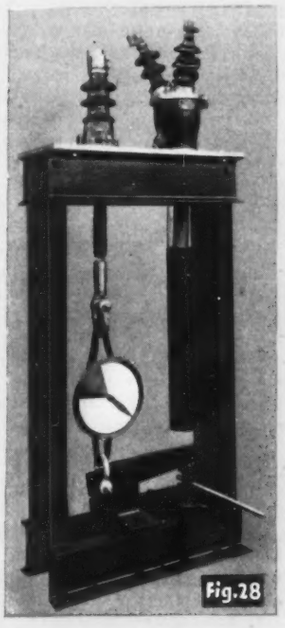


Fig.28


Fig.29

Corporation, New York—Blasting supplies and American explosives, including permissibles and pellet powder.

American Steel & Wire Co. (subsidiary of the United States Steel Corporation), Chicago—"Tiger" brand wire rope for mining applications.

Atlas Powder Co., Wilmington, Del.—Means of securing greater safety in the use of explosives, along with "Manasite" detonators, "Blakstix," "Coalite," "Gel-Coalite" and "Atcol" permissible explosives.

Bethlehem Steel Co., Bethlehem, Pa.—Wire ropes, including "Bethanized" types in which the wires are electrolytically coated with zinc to resist corrosion.

Broderick & Bascom Rope Co., St. Louis, Mo.—Wire-rope engineering service, "Flex-Set" preformed "Yellow-Strand" wire ropes, Murray plaited safety slings.

Cardox Corporation, Chicago—Carbon-dioxide method of breaking down coal, stressing special equipment for the delivery of material to the mines or charging plants.

Carnegie-Illinois Steel Corporation (subsidiary of the United States Steel Corporation), Pittsburgh, Pa.—Santmeyer mine jacks, Lorain steel mine posts and a new application of light-weight-section steel mine timber for use in rooms. This steel timber, for use with the customary wooden posts, is said to be particularly suitable for use at the working face in mechanized mines where large cutters and loaders are used. In addition to safety, advantages include full salvage and a substantial increase in safe working room.

Cities Service Oil Co., Pittsburgh, Pa.—Complete line of mine and industrial lubricants.

Coal Mine Equipment Sales Co., Terre Haute, Ind.—Used and rebuilt equipment service.

Douglas-Guardian Warehouse Corporation, Chicago—Warehousing service.

Duff-Norton Mfg. Co., Pittsburgh, Pa.—Lifting and lowering jacks in capacities from 1 to 100 tons, including the new Series 514 automatic lowering line, now built with a stronger base and operating one-third easier due to a change in fulcrum position.

Also featured by Duff-Norton was its improved mine roof jack built in 7- and 15-ton capacities and various sizes (Fig. 36). These jacks, according to the company, are particularly suited to working in close quarters because of the adjustable slide handle and safe, easy operation.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.—"Lump Coal C" for shooting for coarse coal, detonators with a new shielded shunt of aluminum foil for double protection, and a new series of "Gelobels," as follows: "A," a true gelatin-type explosive similar to the permissible gelatins now on the market but with greater strength and improved fumes; "B," a new semi-gelatin permissible with different properties; and "C," a high-cartridge-count semi-gelatinous permissible with improved plasticity; also a display showing the comparative costs of untreated wood and wood treated with chromated zinc chloride.

Fafnir Bearing Co., New Britain, Conn.—Solid-roller bearings, Fafnir "Precision" ball bearings, including types for mine-car wheels and heavy-duty mine-locomotive service; and ball-bearing motor cartridges.

Flood City Brass & Electric Co., Johnstown, Pa.—Brass and bronze bearings for mine locomotives and other mining machinery, cable vulcanizers, etc.

Gibraltar Equipment & Mfg. Co., St. Louis, Mo.—"Gemco Tru-Blu" keyseater and the new "Gemco Tru-Blu" high-pressure pneumatic grease gun (Fig. 37), described as a low-cost unit saving up to 50 per cent in grease as compared with most other guns. Built of light-weight high-strength alloys, the unit is easy to carry, will grease all types of fittings and holds 20 lb. of grease with the tank full.

Gulf Oil Corporation, Pittsburgh, Pa.—Lubrication services.

Guyan Machinery Co., Logan, W. Va.—"G. M. C." portable arc welder and the Gay tamping-bag-filling machine with vibrating hopper to keep filling material flowing (*Coal Age*, November, 1938, p. 92).

Hercules Powder Co., Wilmington, Del.—Manufacture and testing of explosives (motion pictures).

Hobart Bros. Co., Troy, Ohio—300- and 400-amp. Hobart "Multi-Range" arc welders with ten overlapping welding ranges and 100 volt-ampere adjustments in each range; mine-car mounting for arc-welding service underground; and the new "GR" series of gasoline-engine-driven "Junior" and "Senior" arc welders, also with "Multi-Range" control.

Imperial Bronze Mfg. Co., Jellico, Tenn.—Open-type mine-car compressor unit, conveyor compressor mounted on rubber-tired wheels and a Cantrell self-propelling compressor also suitable for use as 2-ton locomotive. The open-type unit (Fig. 38) is stated to have the smallest size of any unit of equal capacity—105 to 150 c.f.m.—with an over-all height of 25½ in. and a length of 8 ft. 8 in. The compressor is water-cooled with the water-storage tanks in each bumper. The compressor unit, says the company, can be furnished separately, along with blueprints for building the truck at the mine.

With rubber-tired wheels, the conveyor-type compressor (Fig. 39)—73 to 120 c.f.m.—is designed for use in trackless mines as well as in shops. It is mounted on three wheels, with one

Fig.37

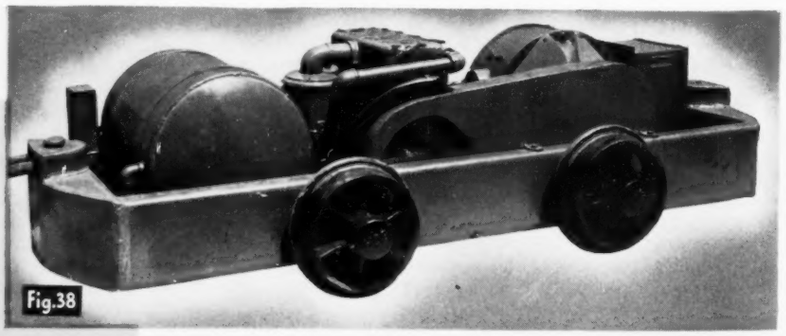


Fig.38

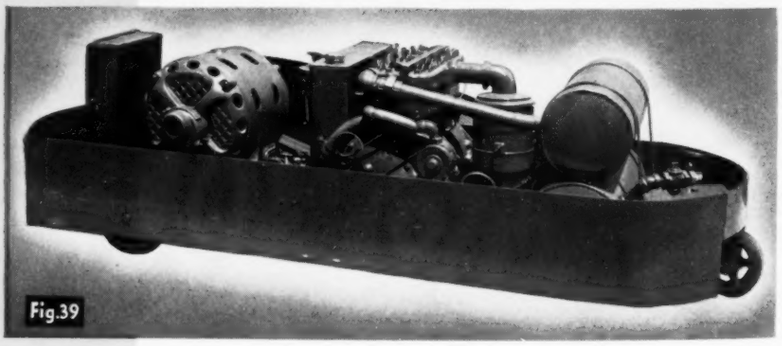


Fig.39

wheel in a ball-bearing caster. Dimensions are: length, 7 ft. 9 in.; width, 31 in.; height, 25¾ in. It is available with either an a.c. or d.c. motor and is mounted in a closed pan with a 2-in. bottom clearance for protection.

The self-propelling compressor (Fig. 40), which also can function as a 2-ton mine locomotive at the smaller operations or as a rock-, coal- or tool-car shifter at larger operations, has an air capacity of 105 to 150 c.f.m. When used as a locomotive, it operates off either a trolley pole or a cable reel and has a speed of 6.7 m.p.h. Springs give greater stability over rough track. The height is 26 in. over the rail and the standard length is 12 ft. Various track gages are available. The compressor now is completely water-cooled and is fitted with an improved air filter and oil control to prevent pumping. Buffers also serve as the air receiver and provide an operator's quarters at one end with a compartment for air hose and drill at the other end. Tool racks on the side also help guard the wheels.

Jeffrey Mfg. Co., Columbus, Ohio—Repair and replacement parts for mining equipment, including a new explosion-tested gearless floating-type cable reel for mine locomotives.

A. Leschen & Sons Rope Co., St. Louis, Mo.—Hercules "Red Strand" preformed and standard wire ropes and accessories.

Linde Air Products Co., New York—Welding and cutting blowpipes, acetylene generators, Miner's Lamp "Union" carbide, floodlights, etc.

Link-Belt Co., Chicago—Chains, pillow blocks, conveyor rolls; improved Link-Belt-Shafer mounted and unmounted bearings; P.I.V. variable-speed gear with remote-control system (Selsyn generators); complete line of welded-steel take-ups, both plain and anti-friction, etc.

Macwhyte Co., Kenosha, Wis.—Newly developed shovel ropes of special steel in a 6x41 flexible construction; shaft-hoist, mining-machine and loading-machine ropes; drilling and scraper lines; and Atlas, Drew and Monarch slings.

Mott Core Drilling Co., Huntington, W. Va.—Core drills and drilling services; pre-grouting of shafts, entries and headings.

Nail City Bronze Co., Wheeling, W. Va.—"Hi-Led-Loy" bearing bronze, which, according to the company, will not freeze on the shaft; titanium-bronze, described as a high-tensile acid-resisting alloy possessing strength exceeding that of steel; and a complete line of bronze parts for mining equipment.

National Carbide Corporation, New York—National carbide, lamps, lanterns and "handy lights."

New Departure Co., Bristol, Conn.—New Departure ball-bearings for mining applications.

Norma-Hoffmann Bearings Corporation, Stamford, Conn.—Mine-locomotive motor cut away to show application of company's ball and roller bearings; self-aligning ball- and roller-bearing pillow blocks and mountings, etc.

Osmose Wood Preserving Corporation of America, Buffalo, N. Y.—Osmose process of wood preservation designed for low-cost treatment of green timber cut on the mine property.

Penn Machine Co., Johnstown, Pa.—Special-alloy non-scoring bronze axle liners, journal liners, bushings and bearings for mine locomotives and mining machines; new-type "Stronger Tooth" hardened pinions for locomotives; solid-axle gears and other improved replacement parts for cutting machines, locomotives, hoists, pumps.

Portable Lamp & Equipment Co., Pittsburgh, Pa.—Permissible blasting units, powder bags, etc.

Post-Glover Electric Co., Cincinnati, Ohio—P-G semi-portable forced-convection-type space heater based on the heat-radiating properties of the P-G Type T-2 chromium-steel resistor. Capacities range from 3 to 9 kw. and the units are equipped with a quiet six-bladed propellor-type fan in a sealed ball bearing driven by a ⅛-hp. motor. The unit is available for 220 to 260 volts and can be used as a fan in warm weather.

Pure Oil Co., Chicago—Lubrication of mine-car wheels and lubricants for specific purposes, such as high-temperature armature grease, water-resisting greases, heavy-duty greases for tramming gears, loader grease and rope dressings.

John A. Roebling's Sons Co., Trenton, N. J.—"Blue Center" rope and wire products and wire-rope fittings.

Shell Petroleum Corporation, St. Louis, Mo.—Complete line of mine lubricants.

SKF Industries, Inc., Philadelphia, Pa.—Complete line of SKF ball and roller bearings and SKF ball- and roller-bearings transmission appliances—pillow blocks, flange units, etc.

Socony-Vacuum Oil Co., Inc., New York—Oils and greases for mine use.

Standard Oil Co. (Indiana), Chicago—Lubrication-engineering service, Nonpareil turbine oil, Superla greases and other industrial and mining oils and greases.

Stephens-Adamson Mfg. Co., Aurora, Ill.—"Simplex" belt carriers, "Seal-Master" ball-bearing industrial units (pillow blocks, flange and take-up units), "Saco" speed reducers and "JFS" variable-speed reducers.

Sullivan Machinery Co., Claremont, N. H.—"Mine-Air" mine-car compressor and replacement parts for mining equipment.

Sun Oil Co., Philadelphia, Pa.—Complete line of mining lubricants.


Fig. 40

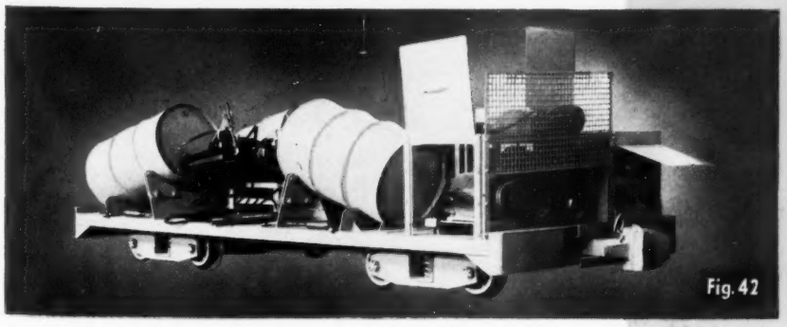


Fig. 42

Fig. 41

W. O. & M. W. Talcott, Inc., Providence, R. I.—Talcott belt fasteners, including the new Acme patch unit for fastening and patching leather, rubber and woven belts which have been broken, cracked or torn. No special machines are required and there are no protruding wires or prongs.

Tamping Bag Co., Mt. Vernon, Ill.—"Seal-Tite" safety-seam tamping bags and the "Seal-Tite" vibrating dummy maker for filling tamping bags.

Templeton, Kenly & Co., Chicago—Complete line of "Simplex" mine jacks, including the new Nos. 84A, 85A (Fig. 41) and 86A 5-ton jacks for cutting and loading machines, rerailing mine cars and light locomotives, shop and track work, etc.; the No. 1017 light-weight heavy-duty 10-ton jack for modern heavy mining equipment; the Nos. 24A and 310A 15-ton jacks, said to be 37 per cent more efficient than the preceding Nos. 24 and 310 units; a complete line of journal jacks; the Nos. M-7 and M-15 mine roof jacks for mechanical mining, the No. 610 "Util-A-Tool" for pushing, pulling, spreading, clamping, lifting and pulling wheels and gears; a new car-straightening jack; and other jacks, post pullers, etc.

Tide Water Associated Oil Co., New York—"Tycol" oils and greases for coal-mining work.

Timken Roller Bearing Co., Canton, Ohio—Complete range of Timken tapered roller bearings for use in all sizes of mine cars, locomotives, conveyors, pumps, compressors and other mining equipment.

Tool Steel Gear & Pinion Co., Cincinnati, Ohio—"Tool Steel" gears, pinions and other replacement parts for all types of mining equipment, featuring "soft-ending" of gears for mine locomotives to prevent chipping in service.

Union Wire Rope Co., Kansas City, Mo.—Wire ropes and cables for deep- and strip-mining applications.

Watt Car & Wheel Co., Barnesville, Ohio—New complete greasing car with Alemite fittings and a capacity of four drums of grease (Fig. 42). The car is equipped with two high-pressure pumps, two low-pressure pumps and six filler buckets—three for hydraulic oil and three for grease—and is designed to meet the problems of lubricating mechanical-mining equipment. Pressure is supplied by an Ingersoll-Rand compressor and an air hose is provided for blowing out motors, in addition to tool boxes on both ends. Designed to be pulled by a locomotive, the car is mounted on four swivel trucks and is equipped with headlights and a cable entrance at both ends. Width of the car is 70 in. and the height to the highest point is 45 in.

Western Cartridge Co., East Alton, Ill.—Complete line of blasting caps and detonators of all kinds, including "Protecto-Spool" blasting caps, "Protecto-Spool" insulated package and "Protecto-Loop" electric blasting caps.

H. Kirk White & Co., Oconomowoc, Wis.—"White's" water-soluble aluminum paint.

Wilson Welder & Metals Co., Inc., New York—Examples of reclamation of mining-machinery parts and track construction as detailed under Air Reduction Sales Co. elsewhere in this review, Type SA 20-amp. arc-welding machine, 100-amp. arc-welding transformer, Jackson A-1 insulated electrode holder, welding electrodes and welding supplies.

Wood Preserving Corporation, Pittsburgh, Pa.—Proper conditioning of wood for pressure treatment with creosote for lengthening its life.

Safety and Rescue Equipment

Mine Ventilation

Advertising Displays, Inc., Covington, Ky.—"Tru-to-Life" safety dramalogues (animated safety messages).

American Brattice Cloth Corporation, Warsaw, Ind.—"Mine-Vent" flexible ventilating tubing with Type B suspension to prevent collapsing when the air is shut off and also prevent slapping from air waves following shooting, "Mine-Vent" demountable couplings, various grades of brattice cloth, Watkins safety battery pouches and the new "Mine-Vent" zipper-type powder bag made of "Mine-Vent" tubing material resistant to acid and moisture. The closing zipper is fitted with a lock.

Bemis Bros. Bag Co., St. Louis, Mo.—"Flexipipe" ventilating tubing in which a rope is sewed into the seam of the tubing for suspending it. Riveted around this rope are sliding clamps which can be moved to the nearest support and installed with a common nail. Horizontal suspension wires are done away with, the company states, and a keyhole slot in the clamp fits over the nail heads and facilitates attaching and detaching.

Brown-Fayro Co., Johnstown, Pa.—"Brownie" BB and the new "Brownie" BC tubing blower (Fig. 43) available for either 230 or 550 volts d.c. or three-phase a.c. The d.c. unit has a capacity of 2,100 c.f.m. with a 1½-hp. motor at a maximum of 5.4 in. water-gage. The a.c. unit is capable of 2,400 c.f.m., 6.8-in. water-gage. The BC blower is designed, according to the company, to supplement the BB unit where more air through longer lengths of tubing is required or where it is desired to ventilate two places with a single unit.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.—"Ventube" system of auxiliary mine ventilation.

Jeffrey Mfg. Co., Columbus, Ohio—New-type Jeffrey "Aerodyne" fan (Fig. 44) said to have double the capacity at the same speed and pressure and a second new-type "Aerodyne" giving 50 per cent more air at the same speed and pressure. Each unit is equipped with adjustable-pitch blades so that the fan can be kept in step with changing mine conditions and efficiency can be maintained. Mechanical efficiency is approximately 90 per cent.

Another new Jeffrey item was the "Aerodyne Midget" axial-flow tubing blower (Fig. 45) delivering the same air as the company's conventional Type 61 tubing blower with a weight of 130 lb., against 240 lb., and a height of 17 in., compared with 20 in. In flameproof construction, the blower uses the same motor and switch as the company's A-6 coal drill.

LaDel Conveyor & Mfg. Co., New Philadelphia, Ohio—Five-foot-diameter high-pressure LaDel Troller fan with


Fig.43

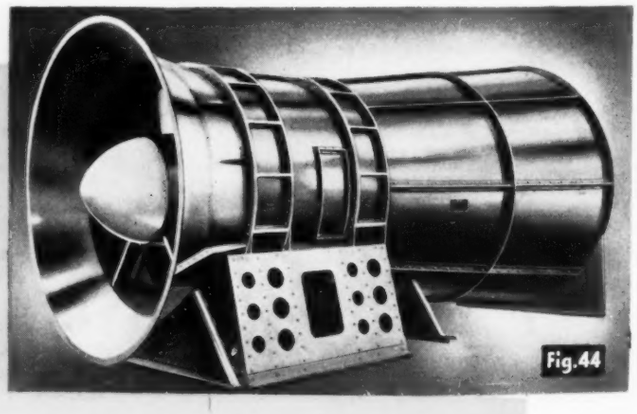


Fig.44

variable-pitch propeller; LaDel-Troller tubing blower.

Koehler Mfg. Co., Marlboro, Mass.—Koehler flame safety lamps, new Wheat Models "O" and "W" electric cap lamps, Wheat handlamps, Wheat spotlights for hand use stated to throw a well-focussed beam 2,500 ft., and a new self-service individual-circuit charging rack. With this rack, the company states, all moving parts, such as rheostats, m.g. sets, etc., are eliminated and each battery is charged on an individidual circuit through a fixed rectifier and resistance. Under this system, the company points out, all the advantages of both the former charging systems are retained and their disadvantages are decreased.

Mine Safety Appliances Co., Pittsburgh, Pa.—Complete line of safety equipment, including: continuous methane recorders, portable methane indicators, Edison electric cap, hand and trip lamps; oxygen breathing apparatus, gas masks, respirators, protective headgear, shoes, goggles, etc.; safety harness, safety lamps, inhalators, car stops, etc.; as well as the following new items: portable dust distributor for conveyor work, semi-portable distributor also available with rubber-tired wheels, "Dustfoe" respirator, molded Bakelite lamp brackets, "Speed frame" for goggle users, hard hat-goggle and hard hat-welding shield assemblies, explosives and detonator carriers (*Coal Age*, December, 1938, p. 138), trolley guard, midget impinger for dust sampling, dust-counting microscope, microprojector for dust counting and size determination, methane alarm, hand-operated carbon-monoxide indicator and the new Edison Model "P" electric cap lamp.

Adaptable to handling by two men, the conveyor-type dust distributor (Fig. 46) weights 175 lb. and will throw about 33 lb. of dust per minute. It is mounted on an alloy-steel skid base. The semi-portable distributor (Fig. 47), also with rubber-tired wheels for conveyor mining, is available in both open and approved types and is powered with a 2-hp. motor giving a discharge capacity of about 60 lb. of dust per minute. Easy moving is emphasized by the maker.

Approved by the U. S. Bureau of Mines, the new "Dustfoe" respirator, weighing 3¾ oz., is said to be compact, have low breathing resistance, be easy to maintain and have a foolproof exhalation valve and protective filter cover. The new molded Bakelite lamp bracket is designed for use on M-S-A "Skullgards" and, in addition to improving the appearance of the hat, resists moisture, maintains its shape and always holds the lamp in correct position. The "Speedframe" unit consists of a pair of goggles mounted in a lightweight comfortable fiber frame so that a simple nod of the head either brings the goggles down in front of the eyes or throws them back up on top of the head out of the way. The goggles remain in either position without further attention.

Along with the "Speedframe," the company showed its combination "Skullgard"-goggle assembly in which the goggles are held in a recess in the visor when not in use and the combination "Skullgard"-welding shield, now giving welders the same head protection as other workers. Under the new plan, several types of welding shields may be fastened on any type of M-S-A hat. Shields are removable at any time.

Designed for clamping on the wire itself, the new trolley guard (Fig. 48) consists of rubber sheeting suspended from insulated hangers in turn supported on the wire. Lightness, easy installation, no interference with the regular hangers or with the trolley pole, and elimination of wear on the sheeting by keeping it from contact with the harp are features noted.

Rounding out its line of dust-sampling and analyzing equipment for health preservation, M-S-A offered the new midget impinger (*Coal Age*, March, 1939, p. 85) weighing less than 10 oz. and adaptable to easy manual operation, a new dust-counting microscope and a new microprojector for throwing an image of the sample, greatly magnified, on a screen so that the operator can count the particles conveniently and determine size.

Using the same principle of operation as the M-S-A methane indicator and tester and designed for continuous operation without the necessity of aspirating samples, the new methane alarm is a portable instrument which sounds an alarm when it is carried into an atmosphere with a methane concentration exceeding a predetermined figure. The instrument is sensitive to concentrations as low as ½ per cent and can be set to operate at any multiple of ½ up to 2½ per cent. The alarm continues to ring until the methane concentration drops below the

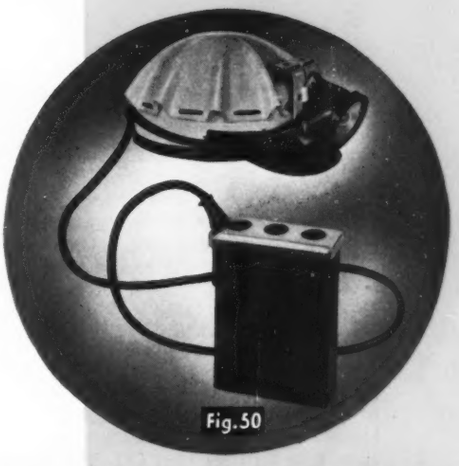


Fig.50


Fig.48


Fig.49

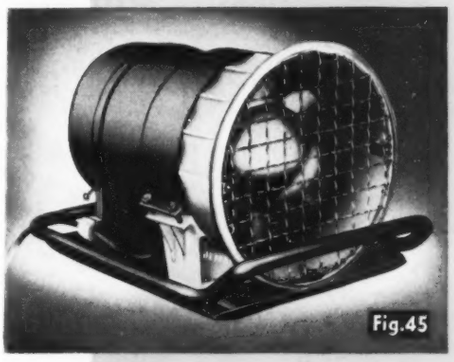


Fig.45

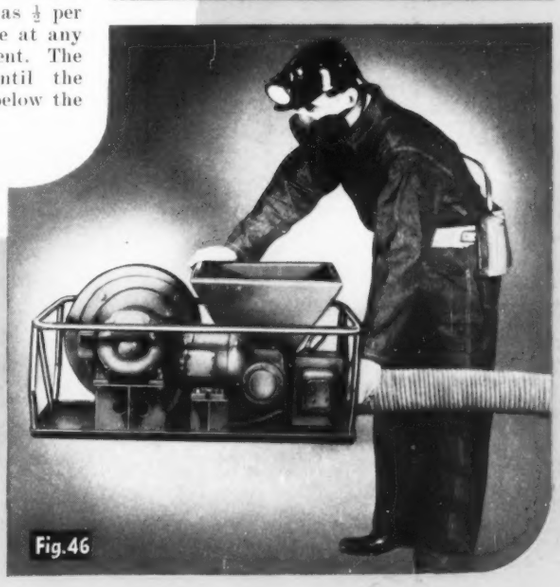


Fig.46

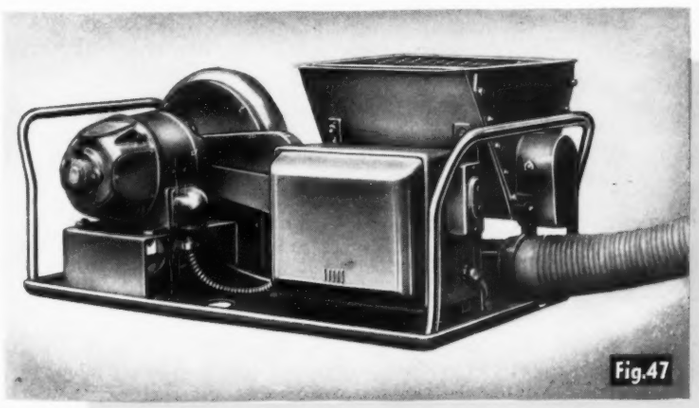


Fig.47

predetermined figure. Operating from a standard Edison cap-lamp battery, the unit is approximately 4x8x6 in. in size with battery. It is especially adapted to use in mechanical mining, the company states, and can be hung on a loading machine, cutter or at the end of a conveyor.

Lightness, portability and the absence of wires are cited for the new hand-operated carbon-monoxide indicator, which includes a hand-operated pump and a built-in pressure regulator for maintaining the correct sample flow. Carbon-monoxide concentration is registered on a direct-reading calibrated meter with a scale range of from 0 to 0.15 per cent CO. The meter can be read directly to 0.005 per cent and readings estimated to 0.001 per cent.

More and brighter light, greater strength and higher dependability are claimed for the new "Streamlined" Model "P" Edison electric cap lamp (Fig. 49), for which the following features are noted: 10 per cent reduction in weight, with the headpiece weighing only 3.7 oz.; highest light output yet in a miner's cap lamp; stronger, more rigid and durable; stainless-steel battery construction; interchangeability with the Model "K" lamps in charging racks; new valve design to eliminate leakage; stainless-steel and beryllium-copper contacts, new cable insulation, parallel-filament bulb, special rubber lens gasket for tight seal, "Neoprene" cable guard, more efficient bulb design, Alzac-coated reflector, stronger lens, larger poles, more positive connections and a safety switch.

Portable Lamp & Equipment Co., Pittsburgh, Pa.—Flame safety lamps, goggles, respirators; safety shoes, headgear and belts; car stops and other haulage safety devices, permissible blasting units, powder bags, heated first-aid cabinets, stretcher boards and other safety equipment, including an approved electric cap-lamp and self-service automatic charging system in which the miner removes his lamp from the rack and replaces it for charging through an individual ampere-flow meter. Batteries charge in parallel on the constant-potential low-voltage system, and each lamp automatically is taken off the line when it reaches its charged state.

Current for the new lamp (Fig. 50) is supplied by a three-cell 6-volt lead-acid battery in a hard-rubber container. Non-spilling vents, according to the company, absolutely prevent leakage or spillage, while the battery is protected by an extra-heavy aluminum cover. A non-corrosive slip-on belt loop releases immediately in an emergency, while the 60-per-cent rubber-sheathed cord is provided with soft-rubber cable protectors at both terminals. Self-tightening cord locks hold the cable securely at the battery cover and switch. A combination switch and charging plug prevents tampering with the switch and controls all lamp functions, including either bulb filament and charging of the battery without removing the cover. The headpiece, it is stated, is light in weight and is fitted with an adjustable cap hook to permit the wearer to focus the light to his individual needs. Light is supplied by a double-filament bulb.

Safety First Supply Co., Pittsburgh, Pa.—Welder's safeguards, head-protecting helmets, Strauss safety belts, E. & J. resuscitators and inhalators, Willson "Super-Tough" goggle lenses, first-aid kits and other safety materials and supplies.

United States Bureau of Mines, Washington, D. C.—Methods of eliminating injuries in the major classes of falls of roof and ribs, explosions and haulage, including methods of handling explosives — particularly priming, proper methods of sounding the roof, sampling to determine the combustible content of mine dust and the advantages of permissible equipment.

H. Kirk White & Co., Oconomowoc, Wis.—"Miner's Special" liquid soap; "So-Wite" hand cleaner.

Mine Pumps and Pipe Lines

Drainage by Drilling

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—Centrifugal pumping units.

Deming Co., Salem, Ohio—Self-priming centrifugal pump for mine-gathering service, double-suction centrifugal pumps, "Prima-Vac-Trap" to prevent refuse entering the valves of reciprocating pumps, deep-well turbine pumps and bowl assemblies and a new low-suction-opening centrifugal pump for gathering work. Maximum capacity of the new unit is given as about 45 g.p.m., and it is constructed with a bronze water end and stainless-steel shaft. With the suction opening down to within 1 in. of the floor, the unit is driven by a ¾-hp. motor and is designed for dewatering working places, discharging into a hose, pipe line, water box, etc., as well as for sprinkling service. Height is about 21 in. and weight is about 50 lb., making it readily portable and doubling its potentialities for use. Current is supplied the a.c. or d.c. motor, including totally inclosed types, by a cable.

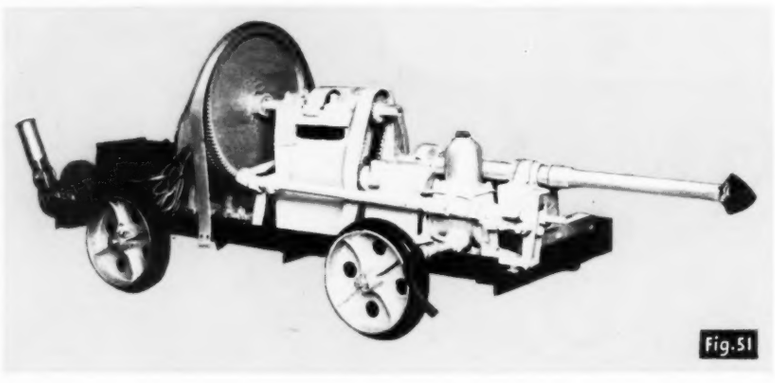


Fig. 51

Flood City Brass & Electric Co., Johnstown, Pa.—Impellers for mine pumps, 2- to 10-in. foot valves, etc.

National Tube Co. (subsidiary of the United States Steel Corporation), Pittsburgh, Pa.—"Duroline" copper-steel pipe and other tubular products.

Penn Machine Co., Johnstown, Pa.—Impellers and other pump parts.

Post-Glover Electric Co., Cincinnati, Ohio—"Universal" cast-iron pipe.

Sterling Pump Corporation, Hamilton, Ohio—Sterling deepwell, impeller and centrifugal pumps.

Watt Car & Wheel Co., Barnesville, Ohio—Horizontal drilling machine (Fig. 51) designed by Robert Foster, United States Coal Co., Smithfield, Ohio, for simpler and more economical handling of mine-drainage problems. The machine drills a clean hole through coal, rock, fireclay and shale, which hole is used for a discharge opening instead of a pipe or column line, thus, it is stated, saving in both pipe and also pumping units where a gravity flow is possible. Drilling length, according to the company, has not been fully determined, but the machine has been used to drill a 5-in. hole 500 ft. long at a rate of 1 ft. a minute. In addition to simplifying mine drainage, including draining or pumping into old works or to the outcrop, the horizontal drilling unit is offered for determining location of faults and old works and cleaning sediment out of pipes.

LOAD-LIMITING SYSTEM

+ Returned Cost in First Month

At Koppers Coal Co.'s C C B Division

REDUCTION in the first month's purchased-power bill exceeded the total installation cost of an automatic demand limiting system put into use last summer at the Stanaford (W. Va.) mines of the Koppers Coal Co. Proportional savings resulted by installation of a similar system for controlling the Glen White and Stotesbury mines, which are served from another metering point. Use of an open-circuit single-wire ground-return control system instead of the usual control circuit design materially reduced installation cost.

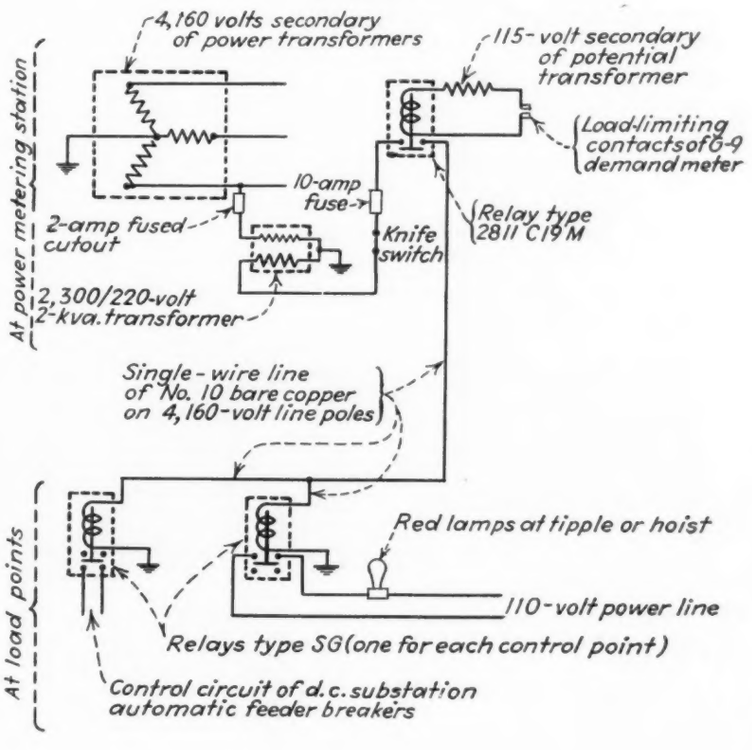
Total, rather than a partial or graduated, demand limiting is the practice: i.e., practically all loads of consequence are cut off when in any 15-minute period the demand meter registers to a predetermined limit. Power to the mine fans is not interrupted and the d.c. substation motor generators and converters are not stopped, but instead the automatic feeder breakers are opened. In tipples not equipped with full-automatic sequence control and at certain other loads such as hoists, operators are signaled by red lamps to cease using power when the limit has been reached. Type G-9 demand meters which make contact at a predetermined kilowatt-hour maximum regardless of proximity to the end of the 15-minute period are used.

Meters Placed in Stations

Demand meters are situated at the a.c. substations, which also are the central metering points from which the power at 4,160 volts is distributed over the coal-company lines to the various loads. Control lines consist of single-wire No. 10 bare copper carried 8 to 9 ft. below the 4,160-volt power lines. Maximum distance from a demand meter to a load-control point as measured along the pole line is 3½ miles. The earth forms one side of the circuit carrying the small current required to operate the relays at the control points.

Power at 220 volts a.c. for control-line current to operate these relays (type SG, rated 0.04 amp., 230 volts) is furnished by a 2-kva. transformer with primary connected between a power wire and ground and with one side of the secondary grounded (see Fig. 1). Operating coils of the SG relays are connected in parallel and the maximum number on a transformer is fourteen. In every case, combined line and ground resistance has come within the limits which permit flow of sufficient current to operate the relay. Contacts of the individual relays, which are double-pole, are connected in series so as to minimize arcing. The pole-line control circuit is opened and closed at the demand

Fig. 1—Control circuit cost was cut in half by using a single wire and ground return.



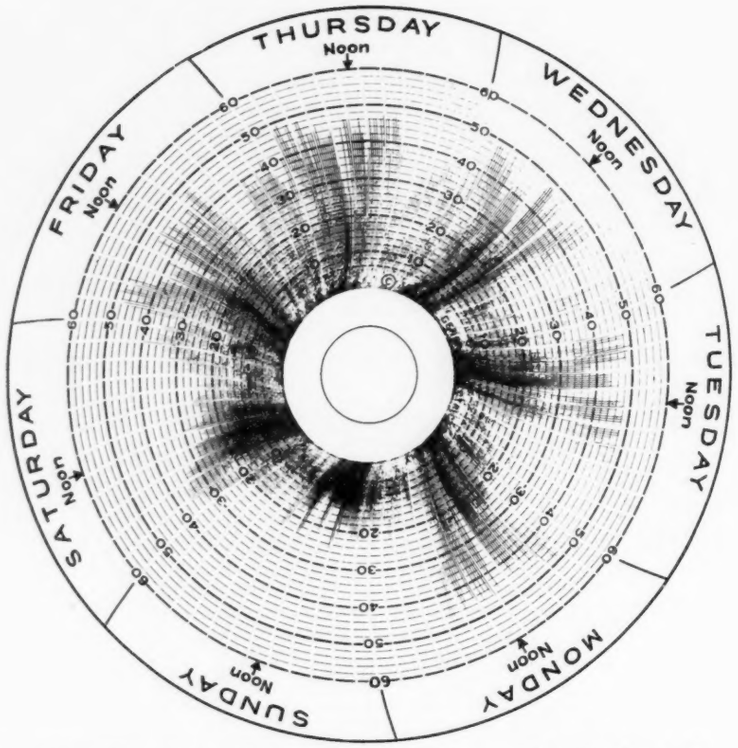


Fig. 2—Graphic chart of 15-minute demands during a week in October at the Soak Creek a.c. substation when the meter was set to function at 1,920 kw.

meter by a type 2811-C19-M relay powered from the instrument potential transformer.

As indicated by Table I, nine load points are controlled at Stanaford, seven at Glen White and the same number at Stotesbury. The two operations last named receive power from a central metering point at Soak Creek (*Coal Age*, September, 1937, p. 47), hence their loads are simultaneously controlled from one demand meter. At Stanaford an SG relay and red lamp are situated in the maintenance shop so that the electricians may distinguish between a demand-limiting interruption and interruptions due to other causes.

Table II shows the demand-limiting accomplishment at Soak Creek, which supplies Glen White and Stotesbury. In July, 1938, the first month of load limiting, the demand was 2,160 kw., compared to 2,400 for the preceding month and 2,480 for July, 1937. Due to an extra pumping load in July, 1938, as compared to the usual July load, the true reduction made by the limiter installation was even greater than the figures indicate.

Table I—Limiters Control the Following Loads:

Stanaford Metering Point

Tipple (signal lamp), 250 kw.
City pump, 20 hp.
Mine pumping station, 200 hp.
No. 2 substation, No. 6 mine, 200 kw.
No. 3 substation, No. 6 mine, 300 kw.
No. 4 substation, No. 1 mine, 200 kw.
No. 5 substation, No. 1 mine, 200 kw.
No. 6 substation, No. 6 mine, 500 kw.
No. 7 substation, No. 1 mine, 300 kw.

Soak Creek Metering Point
Glen White Mine

Mine pumping station, 500 hp.
Tipple (auto-sequence control), 300 kw.
Coal hoist (signal lamp), 700 hp.
Shaft substation, 300 kw.
No. 2 substation, 300 kw.
No. 3 substation, 300 kw.
No. 4 substation, 300 kw.

Stotesbury Mine

Tipple (signal lamp), 250 kw.
Slate larry (signal lamp), 75 hp.
Man-hoist (signal lamp), 100 hp.
No. 1 substation, 300-kw. unit.
No. 1 substation, 100-kw. unit.
East 5 No. 2 substation, 300-kw. unit.
East 5 No. 2 substation, 300-kw. unit.

Table II—Demand Limiting of the Glen White and Stotesbury Loads, Which Began July 1, 1938

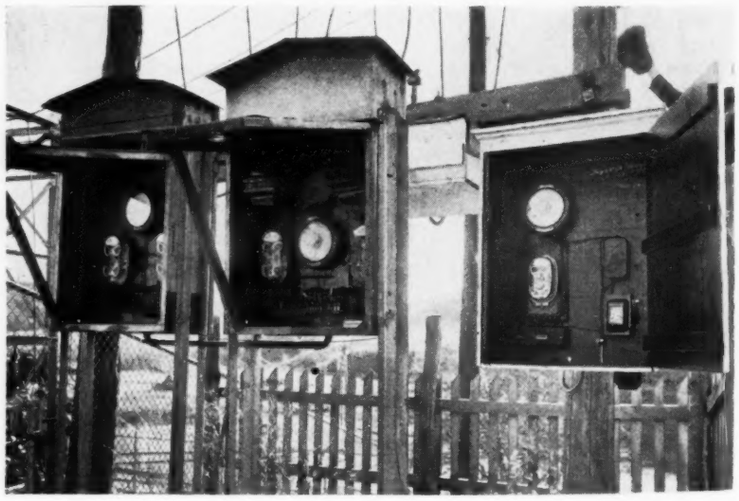
Kilowatts

	1937	1938	
January	.....	2,560	
February	.....	2,560	
March	.....	2,560	
April	2,640	2,480	
May	2,480	2,640	
June	2,400	2,400	
July	2,480	2,200	Limited
August	2,400	2,320	Limited
September	2,480	2,080	Limited
October	2,480	2,000	Limited
November	2,400	2,080	Limited

Limits Set From Charts

Demand limits were set originally by examination of graphic weekly charts to determine the upper limit of the normal peaks, the intention being to cut off only those excesses which occur but a few times per week. Adjustments were made later to strike a happy medium between number of interruptions and extent of limitation. About one interruption per hour per any day of extra heavy demand is the maximum allowed. The meter contacts are adjusted as occasion demands to compensate for changes in fixed load such as seasonal pumping which may be necessary during the working

Fig. 3—Soak Creek meters: Totalizing demand limiting at the right and the mine distribution meters at the left.



shift. Seldom does any interruption last over 1½ minutes and usually the interruptions are much less than a minute. At the Stanaford and Glen White tipples, delays due to demand interruptions are recorded by the operatives, who observe the red signal lamps.

Although mobile loading machines are not used at Stanaford, Glen White or Stotesbury, power consumption per ton is pushed to a high figure by pumping, ventilation and severe grades. Conveyors and scraper loaders, however, are used extensively at Glen White and Stotesbury. Power purchased through the Soak Creek a.c. substation amounts to slightly over 11 kw.-hr. per ton of coal produced at the Glen White and Stotesbury operations.

In Fig. 3 the box at the right contains the demand meter, watt-hour meter, test block, C19-M relay and fused knife switch, which items, in addition to a 2-kva. transformer and the instrument transformers, constitute the limiting equipment at the Soak Creek substation. This limiter is "cut in" ahead of the feeds metered in the two boxes at the left. These latter boxes contain the coal company's distribution accounting meters for the Glen White and Stotesbury operations.

In the Stanaford installation, illustrated by Fig. 4, *A* points to a box housing instrument transformers, *B* to the 2-kva. control circuit transformer, and *C* to a box in which are contained the demand meter and relay. In the distance at the extreme right appears the No. 6 tipple.

The mounting of an "SG" relay which functions to open an automatic d.c. breaker is indicated by *A* in Fig. 5. The photograph was made in a new substation, No. 7, which is one of three now supplying d.c. power to No. 1 mine. Inside of the building and just back of the new automatic panel pictured is the top of a 4-in. steel casing of a 130-ft. borehole through which four 300,-000-circ.mil positive lines feed the mine. Following a practice used previously at Stanaford (*Coal Age*, October, 1938, p. 60), the joints of the casing are welded and this casing is used as an electrical conductor for the negative line. Three 500,-000-circ.mil bare copper cables, situated outside of the casing and grouted in the hole, work in parallel with the casing.

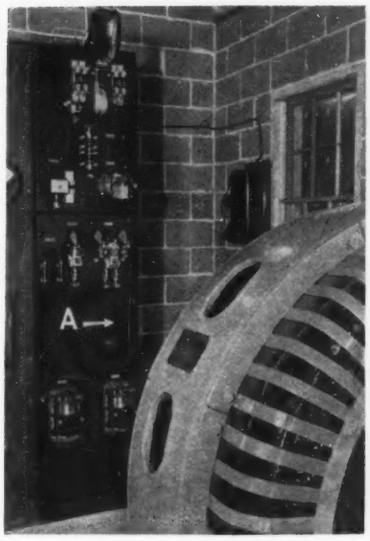


Fig. 5—"SG" relays such as *A* on the automatic panel in this Stanaford No. 7 substation, open control circuits to cut off loads or complete circuits to light signal lamps notifying tipple and hoist operators to stop the equipment.

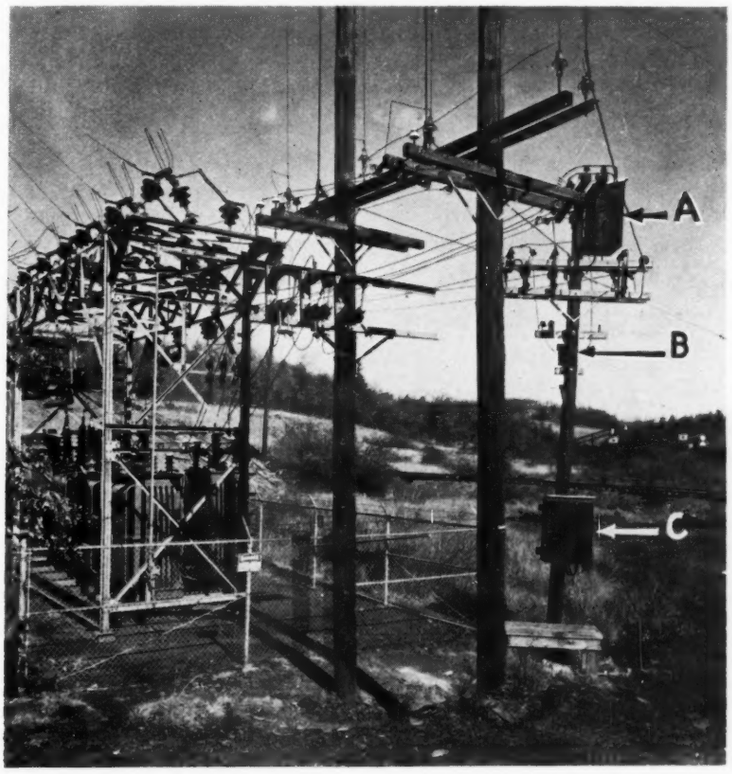
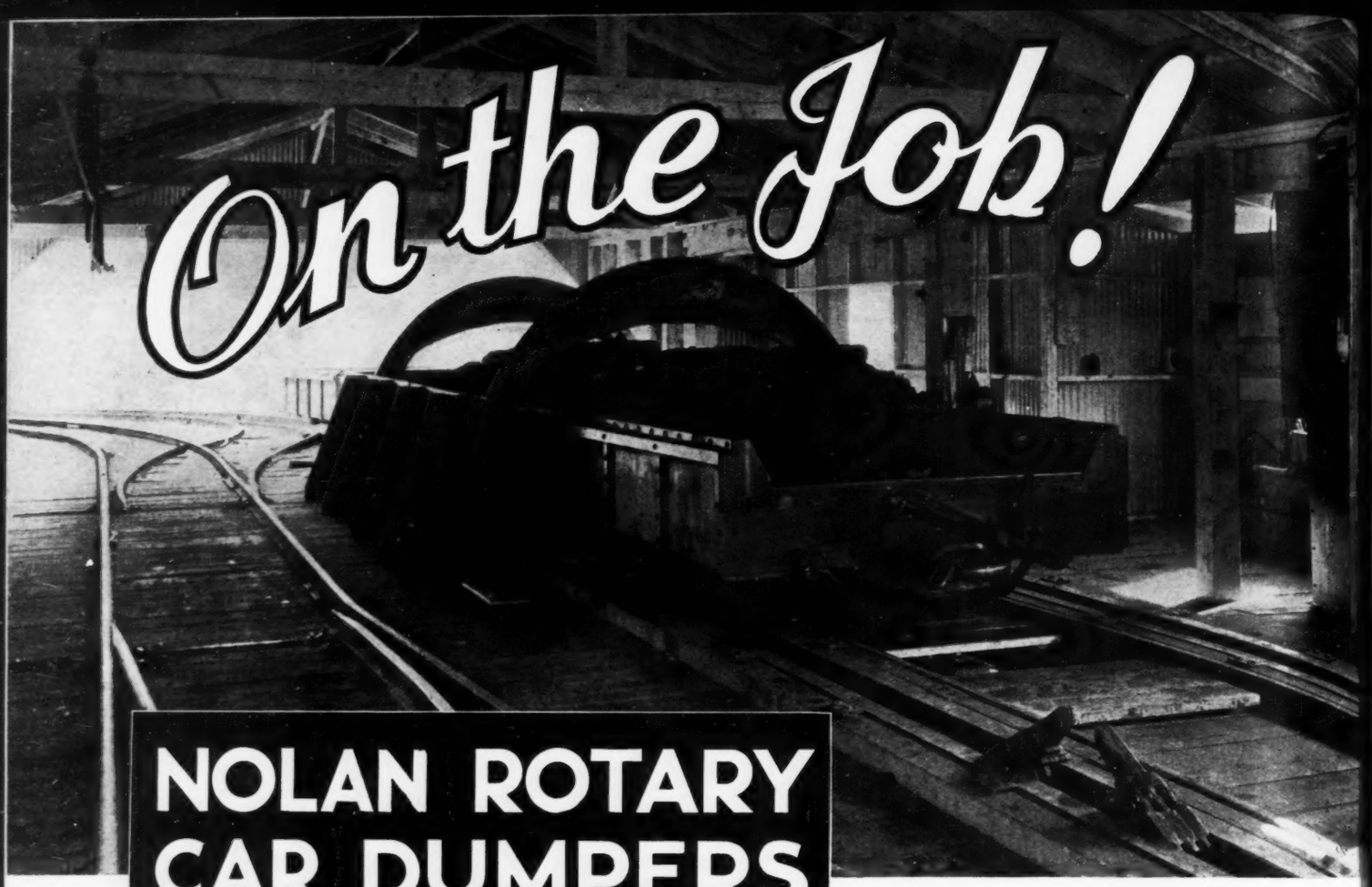


Fig. 4—Arrows *A*, *B* and C point, respectively, to the instrument transformers, the control transformers, and limiter at the Stanaford a.c. substation.



NOLAN ROTARY CAR DUMPERS

ON THE JOB—in modern mining operations in every important coal producing area throughout the United States! And Nolan Rotary Car Dumpers ***stay on the job***—saving time, saving labor and saving coal—because they are right in principle, quick and positive in action and super-strong!

Nolan Rotary Car Dumpers are built for the toughest kind of hard service, and plenty of it. Without heavy shock or strain on car or dumper mechanism, and with a minimum of degradation to the coal, these sturdy, powerful dumpers handle their loads with clocklike precision, ***sharply cutting production costs every hour they operate.***

3 CARS PER MINUTE -- COUPLED OR UNCOUPLED

Nolan Rotary Dumpers make completely practical the use of rigid, solid-body mine cars. If desired, these powerful, dependable, easily controlled dumpers can be furnished to handle two cars or more at a time. For speed, safety and enduring service Nolan is emphatically the dumper to buy. Push button or master control lever makes it an easy, one-man job to handle the dumping operation. The dumper turns 360°, discharging all material cleanly and then stops automatically in upright position, safely locked by positive rail-aligning stop.

Write today for complete information on Car Dumpers of any type—for any operation; also Automatic Cagers, Feeders, Car Stops and other Mine Car Control Devices.

THE MINING SAFETY DEVICE CO.,

BOWERSTON, OHIO

OPERATING IDEAS

From

Production, Electrical and Mechanical Men

Operating Kinks Awarded Twelve Prizes At Cincinnati Miners' Exhibit

WITH OVER twenty items on display, ranging from a scale model of a coal-mine surface plant to a safety hook for handling high-voltage trailing cables for stripping equipment, the Miners' Exhibit at the 16th Annual Convention and Exposition of the American Mining Congress, held in Cincinnati, Ohio, April 24-28, brought prizes to twelve participants. Judges were W. J. Jenkins, president, Consolidated Coal Co., St. Louis, Mo.; R. L. Cox, vice-president in charge of mining sales, Jeffrey Mfg. Co., Columbus, Ohio, and Paul Weir, consulting engineer, Chicago. In charge of the exhibit was W. W. Dartnell, mining engineer, Claremont, N. H. K. R. Bixby, general manager, Midland Electric Coal Corporation, Farmington, Ill., served as vice-chairman.

Among the prize winners was Ernest A. Prudent, chief electrician, No. 1 mine, Bell & Zoller Coal & Mining Co., Zeigler, Ill., with a picture story of special mine-made tools and predetermined methods making it possible to remove and replace a broken Joy 11BU caterpillar drive shaft with a total delay of only 90 minutes, although the machine was 2½ miles from the shop on the bottom. D. Locke, Central State Collieries, Inc., showed by means of photos a buggy used for changing heavy-duty truck tires mounted on four casters and having an underslung platform. This buggy permits removing two wheels and tires, weighing a total of 1,500 lb., at one time instead of separately.

An exact scale model of the topworks at the Willow Grove mine of the Hanna Coal Co. of Ohio, including 80 ft. (actual length) of railroad track with 1,650 reduced-scale ties, was displayed by Joseph Steele, supervisor of painting for the company, St. Clairsville, Ohio. John R. Jones, Warwick mine of the Harwick Coal & Coke Co., Greensboro, Pa., offered a small locomotive model designed to show motor suspension and safety blocks to prevent accidents from failure of the suspension bar or its fastenings. Two sets of wedge blocks on the motor shells hold the motors in position in case of failure of the suspension. A car stop consisting of a rail clamp with a steel-tie-type clip, a short length of wire rope and a hook to fit over the top edge of the car body at either end was shown by Robert Dickson, West Virginia Coal & Coke Corporation, Omar, W. Va. The device operates to stop the car from running either toward or away from the face.

Other winners at Cincinnati were: Ezra Lane, Boone County Coal Corporation; W. T. Dalton, Gauley Mountain Coal Co.; J. T. Parker and H. K. Mundorff, Inland Steel Co.; S. E. Thorne, Lehigh Navigation Coal Co.; Louis O. Carroll, Midland Electric Coal Corporation; J. E. Robles, Pittsburgh Coal Co.; and W. F. Wright, Virginia Iron, Coal & Coke Co. Their exhibits are described separately in the items which follow.

Compromise Welded Joint Has Maximum Strength

Maximum possible strength—i.e., equal to the strength of the smaller rail—is achieved in a compromise rail joint built by W. F. Wright, master mechanic, Virginia Iron, Coal & Coke Co., Toms Creek, Va. Construction of this joint won one of the twelve $10 awards at Cincinnati, where Mr. Wright showed an actual 40-20-lb. joint brought from the mines.

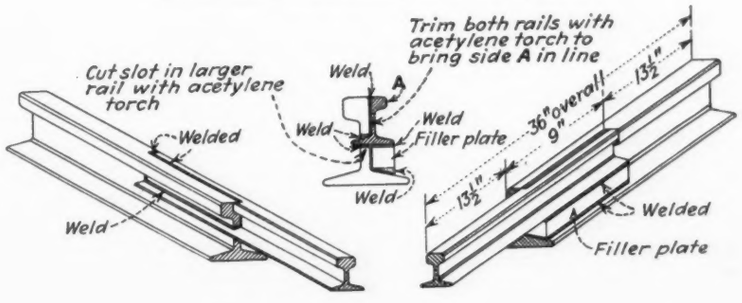
As indicated by the accompanying drawing, the rail ends are slotted and trimmed with an acetylene torch to provide a 9-in. lap. A slot is cut in the web of the larger rail to accommodate the base of the smaller rail and on both rails one side of the ball is trimmed off. A filler plate supports the base of the smaller rail on the wheel-flange side. The job is arc-welded with structural steel rod and upon completion the whole joint is heated to relieve stresses. Standard length is 36 in. and the joints are made up as required in any combination of sizes from 20- to 80-lb.

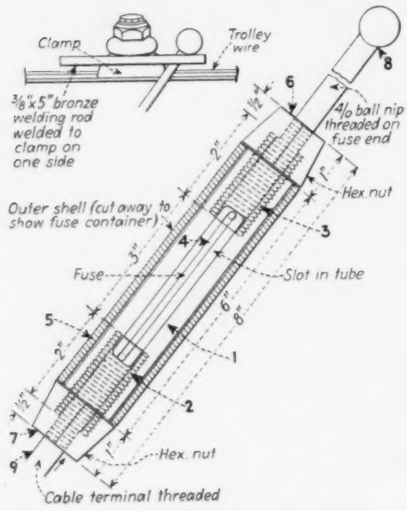
Rod Welded to Clamp Jaw Takes New Ball-Head Nip

Modern safety regulations are outlawing trailing cable nips of the old type which are not designed to disengage of their own accord from the hanger or trolley wire when the normal direction of pull is reversed. A fused hookless nip and a special trolley-wire clamp to which it is to be attached were announced recently by one of the large manufacturers and at the Cincinnati Miners' Exhibit a mine-shop-made combination of nip and special clamp aimed at the same safety achievement won for Ezra Lane, Boone County Coal Corporation, Sharples, W. Va., one of the twelve $10 awards.

As indicated by the drawing, which C. B. Scholl, chief engineer, has furnished

Slotted, trimmed and welded to form a lap joint.





Safer equipment for the Boone County motormen.

for Mr. Lane, the contact nip has a ball on the end and engages between the trolley wire and a ⅜x5-in. rod which has been welded to one jaw of the trolley-wire clamp. Bronze welding rod is the material used for this part which is added to the clamp.

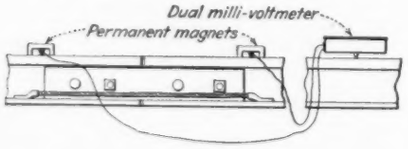
Nine individual parts constitute the fused nip. Part No. 1, the fuse container, is a fiber tube which has a slot at the center 3¾ in. long and is threaded on the inside at the ends to receive the brass bushings, *2* and *3*. Each of these bushings has a ¼-in. hole near one end to accommodate the fuse, *4*. That assembly is inclosed in a fiber shell, *5*, and held in place by the two hexagon-shaped fiber nuts, *6* and *7*.

To complete the final assembly the ball-head nip, *8*, and the cable terminal, *9*, are screwed into the brass bushings, *2* and *3*, to bottom against the fuse, thus making direct electrical contact. The fiber shell, *5*, is 1½ in. in outside diameter and 1 3/16 in. (plus) in inside diameter. The slotted fiber fuse container, *1*, is 1 5/16 in. in outside diameter and ⅞ in. in inside diameter.

Dual Milli-Voltmeter Tester Is Operated by One Man

Two normal men or one superman with three arms, extra long, were the alternatives when testing bonds by the highly efficient dual voltmeter method until there was developed by the Pittsburgh Coal Co. a one-man tester which makes use of permanent magnets to hold two of the contacts to the rail. The showing of a bond tester of this type at Cincinnati won for John E. Robles one of the twelve $10 awards.

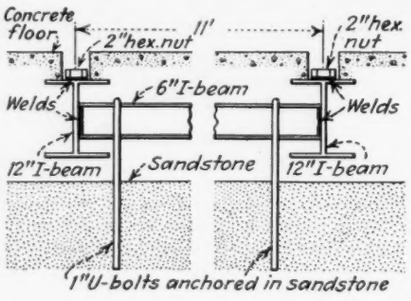
Two of the contacts held by magnets.



Two of the contact points are held to the rail by Alnico permanent magnets and the third is mounted directly on the bottom of the instrument case, which is held by the tester. All points are Stellite-faced and those attached to the magnets are backed with springs so that the magnet poles will contact the rail and maintain a fixed pressure between Stellite points and rail.

Shop Crane and Floor Anchors Quickly Straighten a Car

When the Gauley Mountain Coal Co. built a new mine shop at Ansted, W. Va., provision was made for using the bridge crane of the shop for straightening steel cars. Before the site was leveled and filled for placing the concrete floor, anchor sockets were installed below floor level to accommodate screw-eyes and hooks at four points corresponding to the positions of the car corners when spotted for straightening. A photograph and brief description of this arrangement won for W. T. Dalton, chief mechanic, one of the twelve $10 awards at Cincinnati.



Below the floor—steel beams are anchored to the rock.

As indicated by the photographic illustration, a twist in the car body is being straightened by pulling up on one corner with the shop crane while two other corners are held down by hooks engaging the floor anchors. The crane is electrically operated and has ample capacity to warp the cars to any extent required. The sketch, a section on a line paralleling the track, shows how two 12-in. I-beams to which the sockets are attached are anchored through the agency of a 6-in. I-beam tied to bedrock by U-bolts. Each of the four sockets consists of a 2-in. hex nut welded to a 12-in. I-beam.

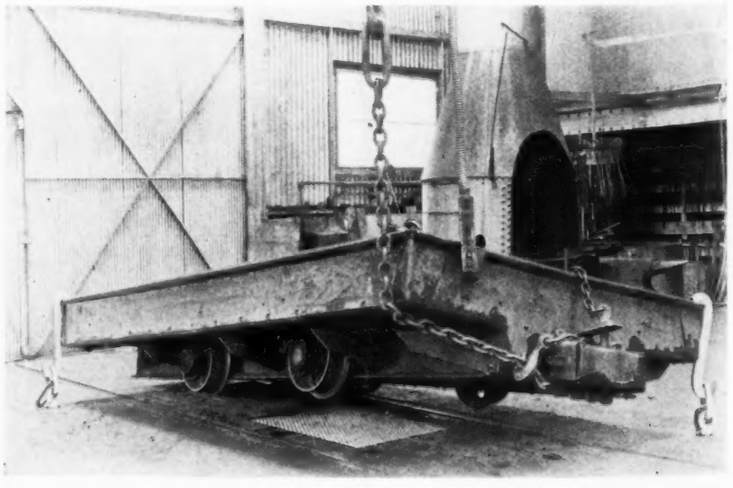
What About It?

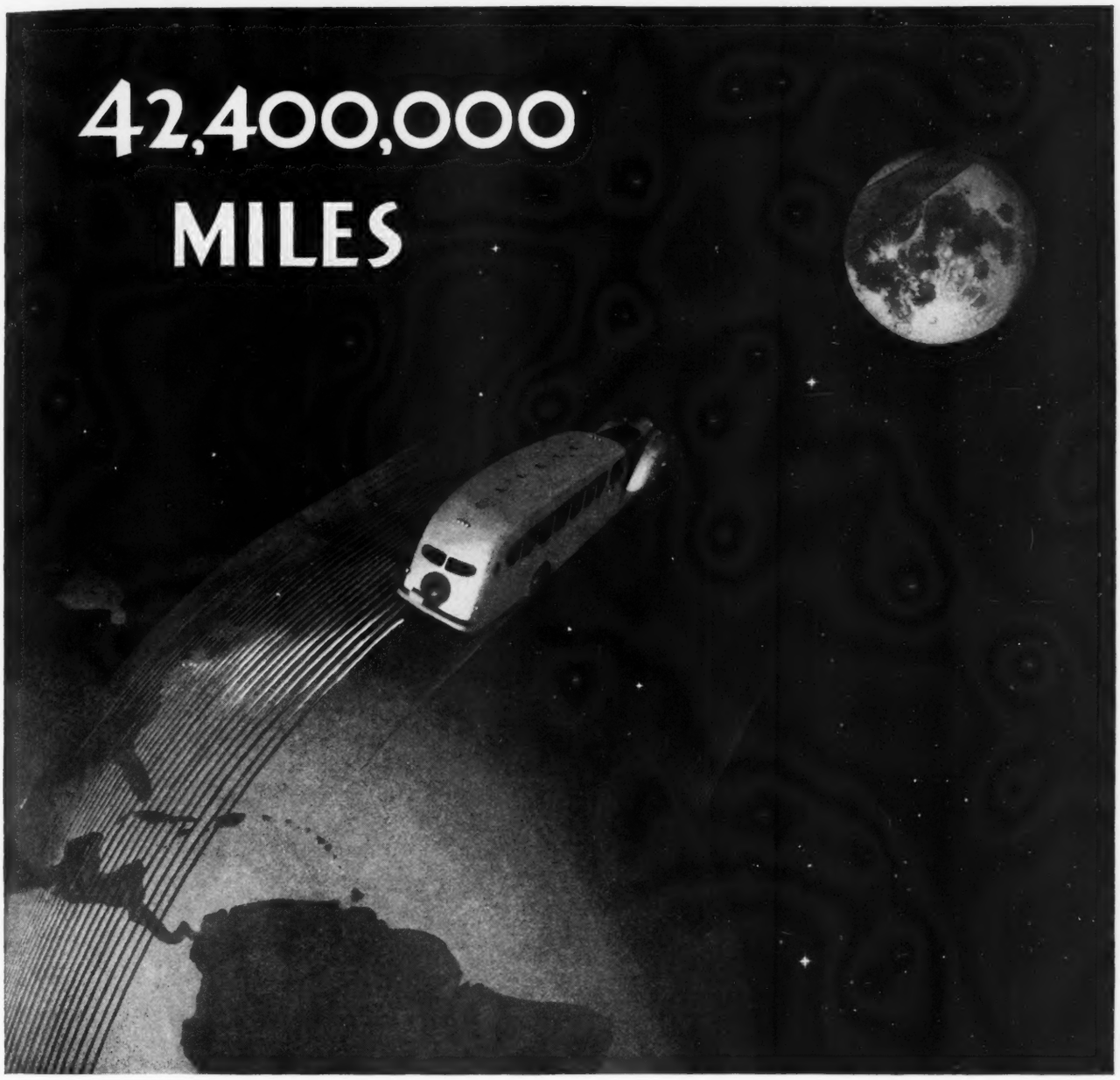
Perhaps you have a kink in your system that you have thought about sending to Coal Age but just haven't gotten around to it. If that is the case, now is the time. The editors of Coal Age welcome any and all ideas dealing with cutting cost, improving efficiency or promoting safety at the mines, and urge operating, electrical, mechanical and safety men to send them in. So let's have yours. Writing skill is not necessary, as we take care of the fine points of slinging the English language. But sketches or photographs would be welcome if they help to make the ideas clearer. And if the ideas are acceptable you will be paid at the rate of $5 or more each.

Maintenance of Trail Cables Facilitated by Sled

To raise portable electric cables off the ground for convenience and speed in making thorough inspections and likewise for proper handling during a major repair, Louis O. Carroll, pit electrician, Farmington, Ill., working in conjunction with Ted Bergrun, electrical engineer, developed for strip pits of the Midland Electric Coal Corporation a horse-drawn sled equipped with working platform and adjustable sheaves. A small-scale model of this device won one of the twelve $10

No trouble now to twist a car back into shape.





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THIS is the combined distance covered by the Exide Motor Coach Batteries in one fleet of passenger buses. It is an average of 200,000 miles per battery . . . not an uncommon record with Exide, because Exides are known as dependable and long-lived batteries. And, in mine locomotives, in every mining field, Exides have by actual service proved their dependability and long life. Likewise their great power-ability and economy.

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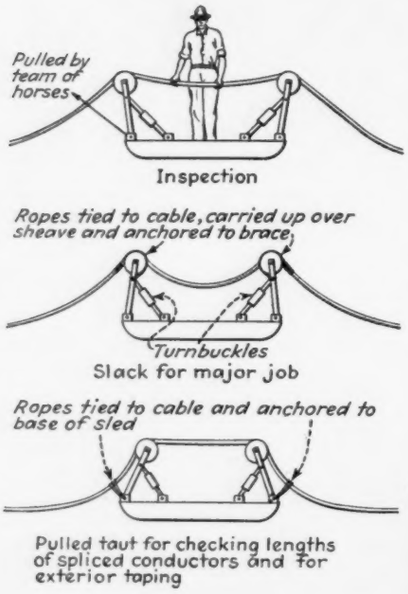
THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto



Showing how cable is raised for inspection and repair.

awards at Cincinnati. This repair sled has proved a worth-while convenience for all conditions and is considered almost indispensable where the cable is in snow, slush, mud or water.

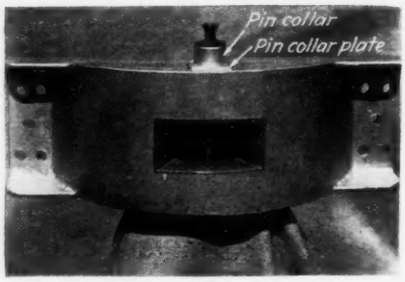
As shown in the upper of the three accompanying sketches, the cable, when the sled is dragged under it, is lifted and runs freely over the sheaves, where it can be inspected on all sides and repairs made to the outer jacket. Likewise the cable is in a convenient position for wiping if necessary for proper inspection. Pivoted pedestals on which the sheaves are mounted are adjustable by means of turnbuckles built into the braces. This sheave adjustment serves in two ways: Where slack is necessary for making a splice this can be obtained by roping the cable and shortening the braces, as indicated by the middle sketch. To pull the cable taut for checking uniformity of length of spliced conductors, for exterior taping and so on, it can be tied, as indicated by the lower sketch, and then the braces lengthened to elevate the sheaves.

This sled is used for inspecting and repairing three-conductor electric shovel cables in sizes ranging from No. 4 to No. 2/0. The voltage is 4,400 and each conductor of a cable is surrounded by a grounded braid.

Coupling Pin Is Permanent On Welded Steel Bumper

Maintenance difficulties with wood bumpers on gathering locomotives, and the delays resulting from coupling pins being lost, mislaid or "borrowed" by other motormen, were licked at the Wheelwright (Ky.) mine of the Inland Steel Co. by replacing the wood bumpers with steel bumpers designed and built by the local mechanical department. This bumper, in which the coupling pin is secured against coming all the way out, won J. T. Parker and H. K. Mundorff one of the twelve $10 awards at Cincinnati.

Details of the bumper design are set forth in the drawing and halftone. The front plate is 1x13 in. and is bent from a piece 4 ft. 7 1/16 in. long. Its weight is 203 lb. and the total weight of the completed bumper is 765 lb. The coupling pin is 1 9/16 in. in outside diameter except that near the center it is upset to form an enlarged section ¼ in. thick and 1⅞ in. in outside diameter. If an attempt is made to pull the pin clear out of the bumper this larger part shoulders against the inside of a pin collar which is fastened to the top plate with machine screws.

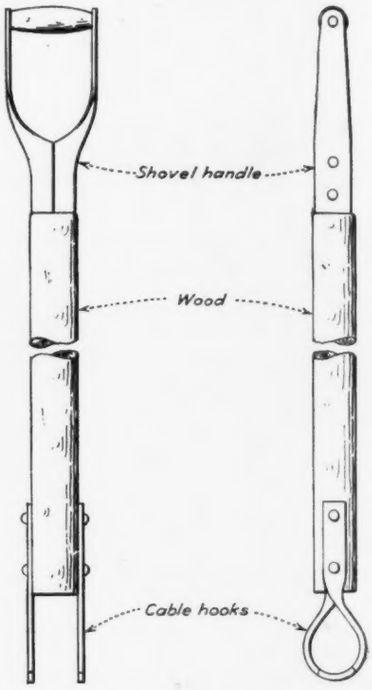


This type of bumper has withstood severe punishment including a bad collision.

Mr. Parker, who is superintendent, states that the new steel bumpers have been subjected to all kinds of operating contitions and have been involved in one bad collision but have shown no signs of failure. Worries from coupling-pin losses are no more and the motor crews are pleased with the bumper and pin design. The locomotives are General Electric 6-ton cable-reel Type HM801 units purchased many years ago and rebuilt prior to 1930 with roller-type journal bearings.

Double Pronged Safety Hook Provides Tension Grip

Designed to protect men who handle cables while power is on stripping and loading shovels, a cable hook shown at Cincinnati won for S. E. Thorne, superintendent of the Summit Hill (Pa.) anthracite pit of the Lehigh Navigation

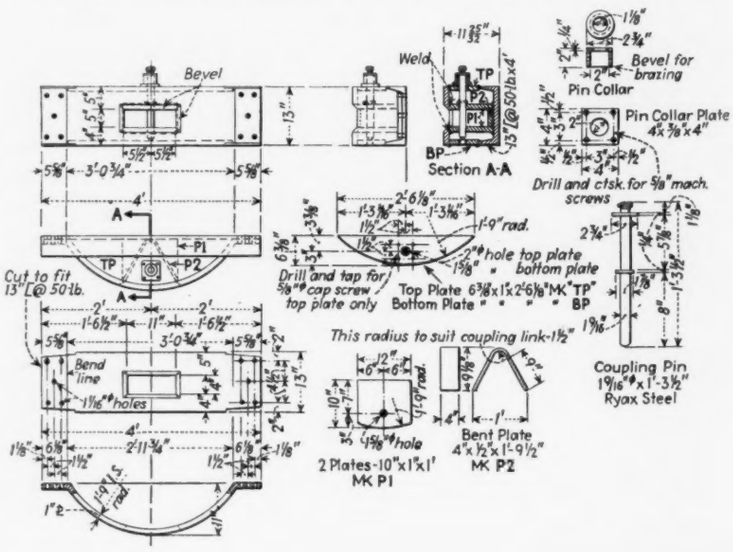


A twist of the wrist grips the cable.

Coal Co., one of the twelve $10 awards. As compared to a plain single hook, this device consists of a pair of hooks which allow gripping the cable to pull it lengthwise as well as sidewise.

An ordinary shovel handle is riveted

Bumper is built of a channel and steel plates joined by arc-welding.



TWO YEARS AND STILL GOING WITHOUT REPACKING A BEARING

• IT HAS BEEN nearly two years since the Superla-greased bearing in this pump motor has been repacked. And that's unusual because this bearing had to be repacked every two or three months before a Standard Lubrication Engineer made a survey and suggested a test of Superla X Grease.

A number of motors were included in this test ranging from ¼ HP to 25 HP in both vertical and horizontal types. One bearing in each motor was packed with Superla X Grease. The other bearing was repacked with the grease formerly used. All but the Superla greased bearings had to be repacked time and again during the past 2 years. Now, Superla has taken over all the grease packed bearings in this plant.

Just the engineer's suggestion and the right product has practically eliminated this maintenance item. Could you use a suggestion like that? You can reach one of these engineers by calling your local Standard Oil (Ind.) office or by writing 910 S. Michigan Ave., Chicago, Ill.

50 FIRST IN SERVICE FOR FIFTY YEARS STANDARD OIL (IND.)

SUPERLA GREASE

STANDARD OIL COMPANY (INDIANA)

LUBRICATION ENGINEERING — THE RIGHT LUBRICANT • PROPERLY APPLIED TO REDUCE COSTS

to a straight round stick of length and diameter about the same as used on a clay shovel. On each side of the bottom end are riveted iron hooks of similar shape made of soft steel and terminated in ⅜-in. round. The space between the open ends of the hooks is slightly greater than the diameter of the cable. Placed over a 1⅞-in. diameter 2,300-volt cable and given a quarter turn or more, the hooks grip tight enough for a man to drag 15 to 20 ft. of the cable.

Mr. Thorne points out that after their cables have been used a number of years the jackets are likely to have a number of slight cuts of unknown depth and therefore the cables cannot be moved bare-handed without risk of shock when the power is on.

Calipers for Pipe-Thickness Made by Arc-Welding

Where water is very acid or heavily charged with gritty material, rapid wear of pipe walls is quite likely, declares Paul F. Erch, mechanical draftsman, Glen Alden Coal Co., Scranton, Pa., in a paper receiving honorable mention in the $200,-000 Award Program sponsored by the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio (*Coal Age*, October, 1938, p. 90). "In some cases," says Mr. Erch, "cast-iron-pipe walls originally 1½ to 2 in. thick have been reduced to a thickness of ½ in. or even less in a few months and in such case they sometimes break out.

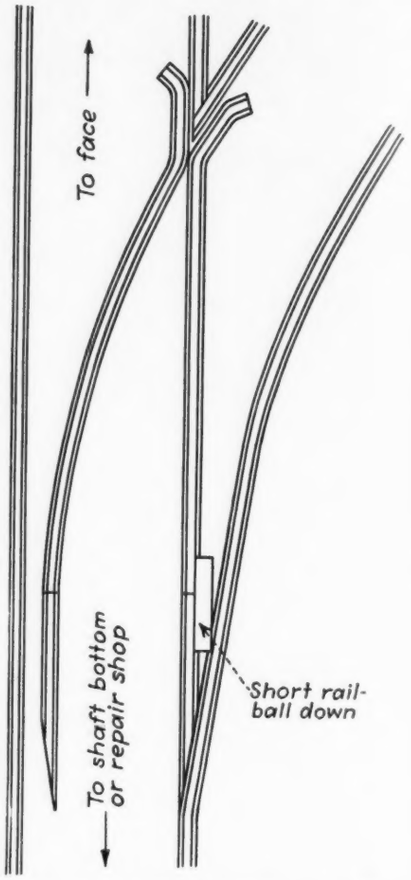
"To forestall these breakdowns, it has been the practice to inspect these pipes in some manner to determine the thickness of metal remaining. A preliminary test by tapping the walls with a light hammer may focus attention on certain pipes or certain spots and drilling a small hole will give a further check on the condition in a particular spot. The drilling and plugging of many such holes, of course, is very undesirable, as each hole then is a weak spot in itself and is of a very limited scope as a test.

"Some form of calipers often have been used to check up metal thickness in such work, but to make a very thorough exploration of a long piece of pipe obviously calls for a rather special type. Such a special pipe-wall caliper is that shown in the accompanying figure, which is designed to reach about half way down the usual lengths of pipe used—i.e., about 5 ft.—and to be suitable for pipes from 6 to 24 in. in diameter. The construction of this caliper is quite evident from the figure. It will be noted that by arc-welding comparatively thin steel metal and thin-walled tubing a rigid construction has been secured and yet the tool is light enough for convenient handling on the job and for carrying by a man for considerable distances in the mines. Actually, the construction has been found so rigid that the errors in measurements need not exceed $\frac{1}{16}$ in. To secure such a happy combination of lightness and stiffness by any other method than arc-welding would be clearly out of the question."

Short Rail Used in Turnouts To Speed Loader Moving

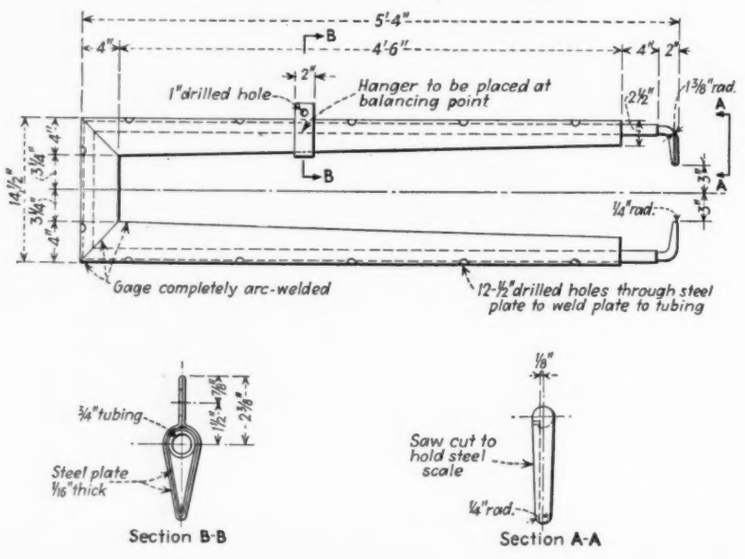
"In these days of mechanization there always are things cropping up that call for a different technique from that used in the old days," writes Thomas James, mine manager, American No. 2 mine, Knox Consolidated Coal Corporation, Bicknell, Ind., in describing a method of easing loading machines over turnouts. When, for instance, a mobile loading machine of the caterpillar-mounted type develops differential trouble it will not move under its own power. In many cases, it is possible to repair it where it breaks down, although this sometimes is uneconomical. On the other hand, some mining companies have a central shop, either above or below ground, where major breakdowns and overhauls are taken care of. But to get a machine to such a shop usually means hauling it a mile or two by locomotive over countless turnouts. "Ask any mining man who has had charge of such a moving job about the trouble he has had in getting over the turnouts. If he is going toward the face he has little trouble, but if he is going away he has to block every turnout—usually with cap pieces—and then he has plenty of trouble.

"Now, we have taken all the trouble out of moving of this kind." The essential item is a piece of 40-lb. rail about 2 ft. long. When it is necessary to go over a turnout, the short rail is placed between the switch and the curved rail the point butts against, as shown in the accompanying sketch. The ball of the short rail is down. When the caterpillar comes up to this short rail it mounts it and this carries the lugs on the cat over the curved rail. Otherwise, the cat lugs hit the curved rail and the machine goes off the track, with consequent grief in getting it back on. "We have reduced it to a system and it is quite common for us to haul a caterpillar-mounted unit two miles in a half hour, using a 15-ton or two 6-ton locomotives to pull it." And, aside from a breakdown, it sometimes is necessary to move a machine from one section to another because of trouble in first working territory. With this method of moving, the loading delay is about half an hour.



The short rail enables the cat lugs to mount the curve and thus keeps the loading machine on the track.

Construction of arc-welded pipe-wall calipers.



Section B-B

Section A-A

WORD FROM THE FIELD

Federal Inspection of Mines Proposed in Congress

Federal inspection of coal mines is proposed in identical bills, sponsored by the United Mine Workers, which were presented in the Senate and House at Washington during the second week in May. Introduced by Senator Neely (D., W. Va.) and Representative Keller (D., Ill.), the measures, if enacted, would authorize the Secretary of the Interior to make "annual inspections and investigations in coal mines the products of which regularly enter commerce or the operations of which substantially affect commerce" for the purpose of obtaining information (1) as to when safety conditions burden or might burden commerce; (2) for determining how public funds may best be spent for the advancement of safety; (3) for safety promotion along educational lines; (4) to assist the Bureau of the Census in connection with certain reports; and (5) for recommendations to Congress in connection with legislation regarding safety in mines.

The proposed legislation also would empower investigations at other than annual intervals when an accident involving bodily injury or loss of life has occurred or upon presentation of a petition signed by a majority of underground workers or their authorized representatives if, in the opinion of the Secretary, such an investigation is warranted. Penalties are provided for refusal to permit the inspection and under still another section operators would be compelled to furnish, upon request, complete information concerning all accidents during the calendar year in which the request is made.

May Publish Findings

The Secretary of the Interior is specifically authorized to report to Congress in detailed or summary form information obtained, together with findings and recommendations as to legislative action; and it is further provided that he may compile, analyze and publish the information obtained, together with findings concerning causes. An advisory committee to consist of an equal number of operators and representatives of mine workers is provided at the discretion of the Secretary of the Interior, the committee to exercise consultative functions.

The bills were referred to the respective committees on Mines and Mining.

Secretary Ickes convened a safety conference last December as the result of the passing of a resolution at the annual convention of the United Mine Workers. The conference was later adjourned as not being of the type desired. At the conference it was brought out that a similar legislative proposal had been prepared for presentation in the 75th Congress, but it was not introduced.

Canada Lifts Excise Tax

The 3 per cent excise tax on imports into Canada from countries other than the British Commonwealth was lifted by the Dominion Government on April 26. While this will reduce the total tax on shipments of coal to our northern neighbor, it is considered of minor importance since a 75c. duty remains in effect and the Dominion Government grants subventions through the payment of freight rates on Canadian-produced coal.

Keeping Step With Coal Demand

Bituminous Production

Week Ended	1939 (1,000 Tons)	1938* (1,000 Tons)
April 1	7,125	4,554
April 8	1,935	5,614
April 15	2,115	5,384
April 22	2,873	5,052
April 29	3,628	5,017
May 6	2,752	4,673
May 13	1,100	5,023
Total to May 13	119,329	116,453
Month of April	**10,747**	**21,671**

Anthracite Production

April 1	803	893
April 8	984	752
April 15	1,212	1,012
April 22	1,519	666
April 29	1,554	655
May 6	1,477	823
May 13	1,463	820
Total to May 13	20,907	17,077
Month of April	**5,227**	**3,138**

* Outputs of these two columns are for the weeks corresponding to those in 1939, although these weeks do not necessarily end on the same dates

Bituminous Coal Stocks

	(Thousands of Net Tons) April 1 1939	March 1 1939*	April 1 1938
Electric power utilities	8,760	8,456	8,479
Byproduct coke ovens	7,222	7,373	5,231
Steel and rolling mills	1,050	879	837
Railroads (Class 1)	7,638	6,736	5,860
Other industrials†	10,555	10,643	9,852
Total	35,225	34,087	30,259

Bituminous Coal Consumption

	(Thousands of Net Tons) March 1939	Feb. 1939	March 1938
Electric power utilities	3,168	3,051	3,015
Byproduct coke ovens	4,855	4,346	3,719
Steel and rolling mills	805	759	787
Railroads (Class 1)	6,976	6,545	6,427
Other industrials†	9,941	9,482	9,236
Total	25,745	24,183	23,260

* Revised. † Includes beehive ovens, coal-gas retorts and cement mills.

Pennsylvania House Passes Anthracite Quota Bill

A bill setting up the first regulatory commission over the anthracite industry in Pennsylvania was passed May 17 by the lower house of the Legislature at Harrisburg. The vote was 111 to 81. If approved by the Senate, the measure would set up a Pennsylvania Anthracite Commission, composed of three members appointed by Governor Arthur H. James, to regulate the production of hard coal within the State and seek new outside markets for the industry. The bill was drawn by Representative Kane (R., McKean).

A State tax of 5c. a ton on all prepared anthracite would be imposed to finance operations of the commission and provide funds for research into uses for hard coal. A price-fixing feature, giving the commission authority to set minimum sale prices for commercial coal, was eliminated at the Governor's request. The chairman of the commission would receive a salary of $10,500, the remaining members $10,000 each, under the supervision of a ten-man advisory board selected by the producers on a basis proportionate to their output.

As drawn, the bill would make the new commission effective for a two-year period, and could then be amended or renewed, at the discretion of the Legislature. It would prohibit any person operating a breaker, washery or operation plant after 60 days from the effective date of the act without a producer's license issued by the commission at a $5 annual fee.

Kill Illinois Strip-Mine Bill

A bill designed to compel strip-mine operators in Illinois to level off and replace soil turned in mining was defeated late in April in committee in the State General Assembly by a vote of 18 to 7. The measure also sought to forbid uncovering more than five acres at a time in strip-mining operations.

Safe Workers Rewarded

Two foremen and 107 workmen in those sections of the Northwestern Mining & Exchange Co.'s operations who established the best safety records in 1938 were the recipients of awards at a safety rally held by the company late in April at Du Bois, Pa. E. A. Charlton, foreman of the winning section in the southern half of the contest, and A. M. Spowart, foreman of the winning section in the northern half, received trophies from G. M. Gillette, vice-president and general manager of the company.

Mr. Charlton's section, in competition

with twelve other sections, worked 128,025 man-hours with only two accidents which caused a total time loss of 106 days. Mr. Spowart's section, competing with five other sections, worked 35,860 man-hours with one accident which caused 240 days' lost time.

C. H. Maize, mine inspector for the company, presided at the meeting, at which safety addresses were made by J. J. Forbes, supervising engineer, safety section, U. S. Bureau of Mines, Pittsburgh, Pa.; Richard Maize, Pennsylvania Department of Mines; C. L. Buhite, superintendent, Kramer mine, and D. R. Marshall, superintendent, Oyster, Toby and Kyler mines.

Rocky Mountain Institute Lists Live Topics

Pillar recovery, preparation and safety will be in the limelight at the annual meeting of the Rocky Mountain Coal Mining Institute. The conclave will be held June 22-24 at Salt Lake City, Utah, nearly a week later than originally scheduled, the postponement having been made so as not to conflict with the Old Timers' celebration at Rock Springs, Wyo.

The tentative program includes the following: "Story of the Rocky Mountain Coal Mining Institute, Its Aims and Ambitions," Fred W. Whiteside, consulting engineer; "Recovery of Pillar Coal," L. P. Pearce, mining engineer, Independent Coal & Coke Co.; "New Tipple and Washing Plant," Walter N. Wetzel, superintendent, United States Fuel Co.; "History of Coal-Mine Haulage," Thomas Allen, coal mine inspector, Colorado; it also is planned to have a paper on safety by Dan Harrington, chief, health and safety branch, U. S. Bureau of Mines; one on explosives, and one by George A. Brown, superintendent, Union Pacific Coal Co.

New Preparation Facilities

CONSOLIDATION COAL CO., No. 25 mine, Clarksburg, W. Va.: Contract closed with Fairmont Machinery Co. for mine-run crushing and picking facilities; capacity, 400 tons per hour.

DAWSON COAL CO., Clarksburg, W. Va.: Contract closed with Fairmont Machinery Co. for mine-run crushing and picking facilities; capacity, 40 tons per hour.

FRANKLIN COUNTY COAL CORPORATION, Royalton mine, Herrin, Ill.: Contract closed with Koppers-Rheolaveur Co. for additions to coal-washing plant, equipment including dewatering screen and sluices; to be completed July 1.

GLOGORA COAL CO., Red Dragon mine, Blue Pennant, W. Va.: Contract closed with Fairmont Machinery Co. for headhouse and rope and button conveyor 1,400 ft. long; capacity, 300 tons per hour; also for additions to the tipple providing for two-stage crushing, remixing and recirculating; equipment is for new mine being opened.

ST. LOUIS & O'FALLON COAL CO., near East St. Louis, Ill.: Contract closed with McNally-Pittsburg Mfg. Corporation for washing plant to handle 150 tons per hour of 3x0-in. coal, to classify into four sizes, using an improved Elmore continuous centrifugal dryer for dewatering 3/8x0-in. coal; to be completed about Sept. 1.

UMW Wins Exclusive-Recognition Fight In Soft and Hard Coal Fields

RECOGNITION of the United Mine Workers as the exclusive bargaining agency for employees covered by union wage agreements and the requirement that all such workers must be UMW members were written into new bituminous-labor contracts signed last month. Opposition to such concessions had centered in the Southern wing of operators in the Appalachian joint conference. This opposition began to crumble, however, when it became evident that many of the Northern producers were ready to yield to the UMW demands and such proposed acquiescence was openly approved by Dr. John R. Steelman, one of the two Department of Labor conciliators attending the conference. Washington insistence that there be a speedy resumption of mining activities also played its part. "We might hold out against John L. Lewis," remarked more than one operator, "but we can't hold out against both Lewis and President Roosevelt."

When the final roll call was held at the Hotel Biltmore, New York City, on May 13, the eight Northern producers' associations parties to the 1937-39 contract voted solidly to accept the new agreement. L. E. Woods, president, Operators' Association of the Williamson Field—the first of the Southern groups to be reached in the roll call—announced that that high-volatile district voted in favor of the contract with reservations. His district, he explained, was not satisfied with the language used in the agreement, but would "vote 'aye' upon the basis of the interpretation and the assurances given by the members of the subscale committee at a meeting last night. This district votes 'aye' with the understanding that the interpretations and assurances in respect to the agreement at last night's meeting will govern the relation between the operators in our field and the union, and further that the secretary of our association be furnished with a complete transcript of last night's meeting."

Walter L. Robison, chairman of the conference and president of the Youghiogheny & Ohio Coal Co., stated that he construed the vote of the Williamson district to be in the affirmative and asked the secretary of the conference, Thomas Kennedy, UMW international secretary-treasurer, so to record it. Spokesmen for the next three districts called—Big Sandy-Elkhorn, Hazard and Kanahwa operators' associations—voted "no." Subject to the same reservations as the Williamson field, Logan producers voted in the affirmative. The Southern Appalachian group cast a negative vote. So, too, did the New River Coal Operators' Association, but later changed to an acceptance on the same basis as Williamson after the Pocahontas producers had followed the Williamson lead. Winding Gulf and Greenbrier operators joined the parade, the Upper Buchanan Smokeless association accepted with the Williamson reservations. Harlan County, Kentucky, and Virginia operators ended the roll call with unqualified "noes."

High-Volatile Men Withdraw

"It is obvious," declared L. C. Gunter, president, Southern Appalachian Coal Operators' Association and the only member of the subscale committee not signing the report recommending the acceptance of the new contract, "that the preponderance of tonnage is in favor of accepting the contract offered. Six high-volatile districts have registered their vote against it. With the understanding that their vote is so recorded, we have no desire to block the conference under the unit rule. As a majority are desirous of going ahead under the contract, the six high-volatile districts which have voted their opposition will withdraw from the conference in order that the proceeding may go ahead."

Formal withdrawal of the dissenting Southern groups was the signal for a hurried huddle on parliamentary procedure. At its conclusion, the chair stated that their withdrawal qualified the previous vote on the motion to approve the report of the subscale committee and ruled that report unanimously adopted by the districts left in the conference. Asserting that the preponderance of tonnage in the dissenting districts favored accepting the new contract, Mr. Lewis warned the operators in those fields not to attempt to reopen their mines until they had signed the new agreement. "There must not be evictions of mine workers from their homes," continued the international president of the UMW. "There must not be shooting of mine workers by coal operators nor any use of lethal weapons against them. That," he added, "goes for Harlan County as for every other area in the six districts."

That the solid front of the opposing groups was not as solid as their withdrawal from the conference might seem to indicate was made plain before final

Wide World

Operators' Representative Signs

Charles O'Neill, operators' spokesman, affixes his signature to the new Appalachian agreement, as David J. McDonald, assistant secretary, negotiating committee, looks on.

Only .002" cylinder wear in MAMMOTH DIESEL

After 3,648 hours with SHELL LUBRICANTS!

IN 1935, the Carthage, Missouri, Water and Electric Plant found that its three Diesel engines no longer had sufficient generating capacity to meet the city's growing requirements for light and power. They went to the Nordberg Manufacturing Company with their problem.

As a result, the Board of Public Works of the City of Carthage contracted with Nordberg for one of their new model 2,250-horsepower TS-216's then being developed and tested in the Milwaukee factory.

With the first development of this enormous new Diesel, Shell engineers closely analyzed its lubrication requirements—called on Shell's wide resources and experience to find the ideal lubricant. Exhaustive block tests proved the exceptional performance of Shell Talpa Lubricating Oils. The new Diesel engine was placed in operation in Carthage, its pistons cooled, its bearings and cylinders lubricated by Shell products—100%.

For 3,648 hours this new Diesel engine ran continuously at the Carthage plant. Then the big engine was stopped and its pistons were pulled for inspection.

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SHELL INDUSTRIAL LUBRICANTS

SHELL

Wide World

Bituminous Wage Conferees Answer President Roosevelt's Summons

Left to right, front row: John L. Lewis, U.M.W. president; Charles O'Neill, operators' spokesman; Van A. Bittner, president, District 17, U.M.W.; Philip Murray, U.M.W. vice-president; Walter L. Robison, president, Youghiogheny & Ohio Coal Co., and chairman of the wage conference; John A. Owens, U.M.W. representative. Back row: David J. McDonald, union representative; J. T. Putman, Raleigh-Wyoming Mining Co.; L. C. Gunter, president, Southern Appalachian Coal Operators' Association; J. D. A. Morrow, president, Pittsburgh Coal Co.

adjournment on May 13. P. C. Thomas, vice-president, Koppers Coal Co.; L. T. Putman, general superintendent, Raleigh-Wyoming Mining Co., and a member of the subscale committee; Mr. Robison, and William Taylor, executive vice-president, Kelleys Creek Colliery Co., all told the conference that they would not be bound by the negative vote of the Kanawha Coal Operators' Association, but stood ready, if necessary, to sign individual contracts to cover their operations in that district. Two days later, at a meeting in Charleston, W. Va., the Kanahwa association formally accepted the new agreement.

The Big Sandy-Elkhorn Coal Operators' Association capitulated to the Lewis terms on May 16. The next day the Hazard Coal Operators' Association, meeting at Lexington, Ky.; the Southern Appalachian association at Knoxville, Tenn., and the Virginia operators signatory to the old agreement, in a meeting at Norton, Va., put their signatures on the new agreement. Harlan County remained the lone hold-out, but individual companies not members of the association began to make peace with the UMW. Among these companies were the Berger Coal Mining Co., Black Mountain Corporation, Black Star Coal Co., Clover Splint Coal Co., Darby Coal Corporation and the Harlan-Wallins Coal Corporation. United States Coal & Coke Co. also signed a captive-mines agreement for its operations at Lynch.

In keeping with his promise of the week before to move National Guard troops into Harlan County to protect those men who wanted to work, Governor A. B. Chandler had 800 militia in that area on May 15 and later increased the armed forces. There were some brushes between soldiers, pickets and working miners, but no casualties. Conferences between the operators' association and district officials of the UMW were held during the week of May 15, but no agreement was reached. In the meantime, the union representatives also were wooing individual producers who showed a disposition to come to terms with them.

No change in hours, wages or working conditions is made by the basic Appalachian agreement signed at New York on May 13. This agreement also continues the Mechanized Mining Commission of eight operators and eight UMW officials, first set up in the 1937-39 contract. Operators members of the commission are: M. L. Garvey, Pocahontas Fuel Co.; J. D. A. Morrow, Pittsburgh Coal Co.; Charles O'Neill, United Eastern Coal Sales Corporation; L. T. Putman, Raleigh-Wyoming Mining Co.; W. L. Robison, Youghiogheny & Ohio Coal Co.; P. C. Thomas, Koppers Coal Co., and L. E. Woods, Crystal Block Coal & Coke Co. The eighth member was not named; under the old agreement, D. A. Reed, Consolidation Coal Co., was specified.

UMW members of the commission are: John L. Lewis, international president; Philip Murray, international vice-president; Thomas Kennedy, international secretary-treasurer; Van A. Bittner, president, District 17; Samuel Caddy, president, District 30; P. T. Fagan, president, District 5; James Mark, president, District 2, and John Owens, president, District 6. As in the former agreement, members of the commission may designate representatives to sit as alternates. The commission is directed to report its findings of fact and recommendations to the Appalachian joint conference to be convened at New York City March 11, 1941. The agreement itself expires March 31, 1941.

Other changes in the contract—exclusive of the names of contracting parties—from the terms of the 1937-39 agreement (*Coal Age*, May, 1937, pp. 231-234) are set out in the paragraphs which follow. New phraseology is printed in italics:

It is agreed that this contract is for the exclusive joint use and benefit of the contracting parties as heretofore defined and set forth in this Agreement. *It is agreed that the United Mine Workers of America is recognized herein as the exclusive bargaining agency representing the employees of the parties of the first part. It is agreed that as a condition of employment all employees shall be members of the United Mine Workers of America, except in those exempted classifications of employment as provided in this contract (see note).* It is the intent and purpose of the parties hereto that this Agreement will promote an improved industrial and economic relationship in the bituminous coal industry, and to set forth herein the basic agreements covering rates of pay, hours of work, and conditions of employment to be observed between the parties in the following districts constituting the Appalachian Territory:

Northern Territory — Pennsylvania, Michigan, Ohio, together with Ohio, Brooke, Hancock and Marshall Counties of West Virginia, and Northern West Virginia, including Counties of Barbour, Braxton, Calhoun, Doddridge, Gilmer, Harrison, Jackson, Lewis, Marion, Monongalia, Pleasants, Preston, Randolph, Ritchie, Roane, Taylor, Tyler, Upshur, Webster, Wetzel, Wirt, Wood, and that portion of Nicholas County including mines served by the Baltimore & Ohio RR. and north, Maryland and Upper Potomac District, including Grant, Mineral and Tucker Counties of West Virginia.

Southern Territory—The State of Virginia, Northern Tennessee, that part of Kentucky lying east of a line drawn north and south through the City of Louisville, and that part of West Virginia not included in Northern Territory.

(NOTE) The amendments to the enabling clause of the Basic Agreement, covering recognition of the United Mine Workers of America, do not change the rules or practices of the industry pertaining to management. The Mine Workers intend no intrusion upon the rights of management as heretofore practiced and understood.

The term Mine Worker as used in this Agreement shall not include mine foremen, assistant mine foremen, firebosses, or bosses in charge of any classes of labor inside or outside of the mine, or coal inspectors or weighbosses, watchmen, clerks or members of the executive, supervisory, *sales* and technical forces of the Operators.

Operators Make Peace Gesture

With temporary agreements in the outlying districts cancelled as of May 4 and 5 (*Coal Age*, May, 1939, pp. 74, 77), developments in the Appalachian negotiations began to move at a quickened pace in the closing days of April. Dr. Steelman, who had joined James F. Dewey as representative of the Department of Labor on April 19, only to vanish from the scene, reappeared on April 25 and informed the press that this time he had been officially commissioned by Secretary Perkins to undertake "the immensely difficult task" of breaking the deadlock between operators and miners. On May 2, the operators made a further peace gesture by offering to couple their previous proposal to recognize the UMW as "the exclusive bargaining agency" under the National Labor Relations Act with an agreement to check off an amount equal to present minimum union dues of all employees whether union members or not. The amounts so checked off were to be paid over to the UMW as a service charge for administering the contract.

This offer, rejected by the union after a meeting in which seven lawyers discussed it, so provoked James Walter Carter, president, Carter Coal Co., that he resigned from the operators' scale committee. His place was taken by Raymond

WHAT YOU DON'T SEE IN THIS PICTURE...

IS THE VITAL PROTECTION AFFORDED SWING GEARS BY MARATHON VEPRESSA

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James H. Pierce

Operator representative in anthracite wage negotiations

E. Salvati, vice-president, Island Creek Coal Co. With this compromise proposal in the ash can, the stage was then set for a report from the subscale committee announcing the inability of the negotiators to agree. This move was blocked by Dr. Steelman when the full joint conference again reconvened on May 5. With his notes crackling in his trembling hands, he insisted that "you cannot and must not break up this conference and go home and start a civil war." In the name of the American people and of the federal government, he demanded that the negotiations continue and that each side designate a committee with full authority to act.

Mr. Lewis suavely answered that the UMW recognized the right of the government to make this request. "The UMW is willing now to appoint a committee of the character requested to meet with Dr. Steelman and a similar committee of the operators with a grant of authority from the international policy committee." The coal operators, "under these strange circumstances," stated Mr. O'Neill, would, of course, agree to the request, although there was a fundamental issue involved which "the operators would have been pleased to debate before the American people." They were willing to try again to reach an agreement with the miners, but "it will require more than platitudes or scoldings to bring about that happy result." Both operators and UMW named the members of their subscale committee to meet with Dr. Steelman.

The next day, President Roosevelt, who had previously refused to intervene personally in the situation, made public a telegram he had sent to the conferees stressing the paramount character of the public interest and urging the negotiators to continue their work. This was followed on May 7 by the release of a letter from Mr. Lewis to Dr. Steelman in which the UMW president scored the administration for not backing up the March proposals of the union for an agreement to continue work at the mines pending the completion of the Appalachian negotiations. To this Mr. O'Neill retorted that an agreement on all questions but the closed shop had been reached on March 30 and that "work could have been continued under the agreement reached March 30 just as well as it could have continued for 30, 60 or 90 days or six months." Mr. Lewis countered that union agreement as to wages and hours was contingent upon acceptance of its union-shop contract.

On May 9, the joint subscale committee journeyed to Washington to meet with the President. No statement was given out by the conferees at the close of a 75-minute White House visit, but it was unofficially reported that the President had demanded that mining be resumed "this week" and that he wanted an answer to his demand within 24 hours. This answer was not forthcoming, although the subscale committee remained in session at New York until the wee sma' hours May 10. Following that meeting the operators stated that they had offered:

1—Immediate resumption of work at all mines in the Appalachian region;

2—Recognition of UMW as exclusive bargaining agency;

3—Immediate renewal of 1937-39 contract for another two years;

4—Continued negotiation to find some mutually acceptable formula "which will preserve the integrity of the agreement and the jurisdiction of the UMW from attacks under the provisions of the National Labor Relations Act, the parties agreeing that they will, if necessary, jointly support emergency legislation designed to accomplish this purpose."

Rejecting these proposals, Mr. Lewis stated that, at the request of the government, he was notifying UMW presidents in outlying districts to enter two-year contracts with operators in those areas for the immediate resumption of work, provided said operators agree to the union-shop provision. Convinced "that a formula for a blanket contract cannot be found at this time," Dr. Steelman "recommended" that the joint conference be dissolved and that such associations and individual operators as were willing to do so sign the union-shop contracts.

Even before the final session of the Appalachian conference, outlying districts began to make peace on the Lewis terms.

Harris & Ewing

Ralph E. Taggart

Operator representative in hard-coal contract conferences

Western Kentucky was the first, closely followed by Illinois and Indiana. Within a few days all the outlying fields except Alabama, which had declined to accept the original temporary agreement, had signed up. Attempts of the Progressive union—the real target of the UMW in the long-drawn-out negotiations at New York—to enter the picture in that State via the Wagner act were blocked when the National Labor Relations Board on May 16 held that the AFL miners' organization lacked sufficient membership at operations to constitute a dispute as to representation under Sec. 9 (c) of the Wagner act.

Consumer fears of a coal shortage, which helped build up public pressure for a settlement, vanished a few days before the Appalachian agreement was signed. Prices for coal softened materially and, with the resumption of full-scale

(Turn to page 96)

Wide World

Appalachian Conferees Resume Wage Negotiations

Seated at conference table, left to right: J. D. A. Morrow, president, Pittsburgh Coal Co.; Walter L. Robison, conference chairman; Thomas Kennedy, U.M.W. secretary-treasurer; Philip Murray, union vice-president. Standing: L. T. Putman, Raleigh-Wyoming Mining Co.; L. C. Gunter, president, Southern Appalachian Coal Operators' Association; John O'Leary, international board member, U.M.W.; John Owens, president, District 6, U.M.W.; David McDonald, assistant vice-president, U.M.W., and Van A. Bittner, president, District 17, U.M.W.

COMPLETE INFORMATION

+ On Equipment, Materials and Supplies

Exhibited at the Cincinnati Show, April 24-28, 1939

WOULD you like to have more information on the important array of equipment shown at the recent National Exposition of Coal Mining Equipment of the American Mining Congress at Cincinnati? An editorial summary of the high spots of the show appears on pp. 59–74 of this issue. For those who desire additional data *Coal Age* also makes this special arrangement to enable you to get further specific information without cost or obligation. Simply mail the accompanying postcard with your name and address to *Coal Age*—no postage necessary—and your request will receive our prompt and careful attention.

Products exhibited are listed below, classified alphabetically by companies sponsoring them. Each company has a number. Corresponding numbers appear on the postcard. To obtain any manufacturer's data, simply circle the "company numbers" of interest to you and drop the postcard in the mail. *Coal Age*, upon receipt, will see that you are furnished promptly with desired details.

• **COAL AGE launched this service in 1937; repeated it last year. In 1938, these listings developed 2,374 requests for manufacturers' literature from hundreds of officials and engineers at various mining companies, located in every coal-producing region of the country. We hope you use and profit from this service again this year. It's yours for the asking!**

1 ADVERTISING DISPLAYS, INC.: Animated displays for promoting safety in mines.

2 AHLBERG BEARING CO.: CJB ball bearings; Ahlberg ground bearings; RBC straight-roller bearings; Bower tapered-roller bearings; pillow blocks; Croft bearing washer and packer.

3 AIR REDUCTION SALES CO. (with National Carbide Corporation and Wilson Welder & Metals Co., Inc.): Welding and cutting apparatus, supplies and gases; hard-faced coal-mining bits; bronze-welded mine rails; reclamation of mining equipment by welding; carbide, carbide lights and lanterns; flame-hardening apparatus; fabricated switch points and frogs.

4 LOUIS ALLIS CO.: Explosion-proof, splash-proof, drip-proof and dust-proof electric motors.

5 ALLIS-CHALMERS MFG. CO.: Sta-Kleen and other vibrating screens, electro-magnetic feeders and conveyors; "Vari-Pitch" speed changers; motors and control apparatus.

6 AMERICAN BLOWER CORPORATION: "Fluidrive" hydraulic coupling.

7 AMERICAN BRATTICE CLOTH CORP.: "Mine Vent" brattice cloth and flexible ventilating tubing, tubing couplings, powder bags and battery pouches.

8 AMERICAN CAR & FOUNDRY CO.: Low-type electrically welded drop-bottom steel mine car; heat-treated car wheels equipped with all types of anti-friction bearings, or plain and self-oiling bearings; special and standard mine-car couplings, swivel links, link-and-clevis couplings; double-acting electrically welded spring bumpers for mine cars.

9 AMERICAN CHAIN & CABLE CO., INC.: "Tru-lay" and "Lay-Set" preformed wire rope.

10 AMERICAN CYANAMID & CHEMICAL CORPORATION: "American" explosives and blasting supplies.

11 AMERICAN STEEL & WIRE CO.: "Tiger Brand" wire rope and wire-rope fittings; aerial tramways; track and tramway cables; "Tigerweld" rail bonds; welding electrodes; "Amerclad" and "Amercore" electrical wires and cables; "Amerglas" insulation; spikes, wire and nails; new "Amerbestos" AVC mining cable with varnished cambric and asbestos insulation.

12 ANACONDA WIRE & CABLE CO.: Copper wire, non-metallic underground cable, telephone wire, shooting wire, cable accessories, potheads, borehole suspension units; "Vitrotex" glass-insulated magnet wire; Sunex Security-flex mining cable.

13 ATLAS POWDER CO.: Explosives and blasting accessories, "Manasite" detonators.

14 BARBER-GREENE CO.: Sectional mine belt conveyors and standardized material-handling equipment.

15 BEMIS BRO. BAG CO.: "Flexipipe" ventilating tubing and couplings.

16 BETHLEHEM STEEL CO.: Mayari R steel mine car, and motorized mine-car chassis showing hydraulic brake action; application of Mayari R in trail cars, skip hoists, cages, conveyors, etc.; forged-steel mine car wheels; wire rope, stressing Bethanized rope for prevention of corrosion; Mayari R high-strength corrosion-resisting steel for weight reduction; room switch mounted on welded steel ties with No. 1201 switch stand, reflector target stand, malleable heel blocks; spring toggle for room switches, steel and Koppers-Armoored ties, manganese frog, No. 1227 switch stand, "Superior" drill steel.

17 BITUMINOUS COAL RESEARCH, INC.: Examples of research activities in coal utilization.

18 BOWDIL CO.: Cutter chains, bits, bars and sprockets; Bryant "Choke Arc" transfer switches, spike pullers, detachable auger and pick bits.

19 BRODERICK & BASCOM ROPE CO.: "Yellow Strand" wire ropes, including "Flex-Set" preformed types.

20 L. M. BROWN, INC.: Semi-automatic cutter-bit furnace and forging machine, self-hardening cutter-bit steel.

21 BROWN-FAYRO CO.: Latest Model HKL car-spotting hoist, HGD conveyor auxiliary hoist, new BC tubing blower, RD electric car retarder, 2F8 high-pressure oil-spray pump, TRE chilled-cast-iron track roller, TRF rubber-covered track roller.

22 BUCYRUS-ERIE CO.: Pictorial display of stripping and loading shovels; 29-T blast hole drill.

23 CARDOX CORPORATION: Junior charging plant, Cardox CO_2 fire extinguishers for mine use, 3½-ton truck transport unit with enough liquid CO_2 to produce 21,000 tons of coal.

24 CARNEGIE-ILLINOIS STEEL CORPORATION: Rails, steel ties, rolled mine-car wheels, "Cor-Ten" steel mine

cars, track bolts, spikes, frogs, etc.; structural plates and shapes, steel sheets and piling, underground mine conveyors, Lorain collapsible mine posts, Santmeyer timber jacks, steel mine timbers.

25 CENTRAL ELECTRIC REPAIR CO.: Tramp-iron magnets and portable field coil tester.

26 CHICAGO PNEUMATIC TOOL CO.: Permissible and open-type portable hand-held and mounted electric coal drills; electric and pneumatic drills, nutrunners, grinders, chipping and riveting hammers, and pneumatic rock and auger drills, and the new 571 "Whippet" coal drill.

27 CINCINNATI MINE MACHINERY CO.: Cincinnati bit-making plant for production of "Duplex" cutter bits at the mine, cutter bars and "Duplex" chains—both standard and thin-kerf.

28 CITIES SERVICE OIL CO.: Samples of oils and greases for coal-mining equipment.

29 COAL MINE EQUIPMENT SALES CO.: Used and rebuilt mine equipment.

30 COLUMBIA STEEL CO.: Products of the United States Steel Corporation in the West.

31 CYCLONE FENCE CO.: Woven-wire fencing.

32 DEISTER CONCENTRATOR CO.: Leahy "NO-Blind" vibrating screens, "Concenco Duplex" coal-washing tables, "Concenco" spray nozzles, Deister-Overstrom Diagonal-Deck coal-washing tables.

33 DEISTER MACHINE CO.: Deister "Plat-O" coal-washing tables; "Plat-O" vibrating screens; "Multirap" vibrating screens.

34 DEMING CO.: Deep-well turbine pump; self-priming centrifugal gathering pump; Deming "Prima-Vac-Trap"; portable (¼-hp.) low-suction-opening gathering pump.

35 DIFFERENTIAL STEEL CAR CO.: "Axless" mine cars, new high-speed "Axless" locomotives.

36 DOUGLAS-GUARDIAN WAREHOUSE CORPORATION: Field warehousing service; financing by inventory loans.

37 DUFF-NORTON MFG. CO.: Automatic lowering jacks with removable operating mechanism; new design of roof jacks with special slide handles that improve leverage; complete line of jacks of all types.

38 E. I. DUPONT DE NEMOURS & CO.: Permissible explosives and detonators, chemical products, "Ventube" ventilating tubing, chromated zinc chloride wood preservative.

39 DUSTLIX CORPORATION: "Dustlix" dustproofing liquid and equipment; trademarking of coal by automatic and manual machines.

40 THOMAS A. EDISON, INC.: Nickel-iron-alkaline storage batteries.

41 ELECTRIC CONTROLLER & MFG. CO.: "Line-Arc" sectionalizers.

42 ELECTRIC RAILWAY EQUIPMENT CO.: Equipment for complete trolley and feeder systems.

43 ELECTRIC RAILWAY IMPROVEMENT CO.: Rail bonds and arc-welding rheostats.

44 ELECTRIC STORAGE BATTERY CO.: "Exide-Ironclad" and "Exide-Hycap" batteries.

45 ENTERPRISE WHEEL & CAR CORPORATION: Low-type, large capacity, four-axle mine cars; Smith pit-car loader.

46 FAFNIR BEARING CO.: New flange-type motor cartridge for replacing plain bearings with ball bearings, complete line of ball bearings with heavy-duty bronze retainers; roller bearings for locomotives; sealed and prelubricated conveyor bearings.

47 FAIRMONT MACHINERY CO.: Pictorial exhibit of Chance sand-flotation coal-cleaning process, coal-preparation plants.

48 J. H. FLETCHER & CO.: Rubber-tired haulage for coal from 30 in. up, featuring Fletcher automotive haulage equipment.

49 FLOOD CITY BRASS & ELECTRIC CO.: Brass and bronze trolley wheels, harps, pole heads and trolley splicers; rail bonds, transfer switches; cable vulcanizer; water end for plunger pumps; "No Fuse" permissible starters; room-hoist and conveyor controllers; new and replacement parts for pumps; 5-hp. hoist for car spotting underground, foot valve for mine pumps.

50 GENERAL ELECTRIC CO.: New permissible 25-hp. d.c. starter, Type CD 25-hp. d.c. permissible motor, Type BM 5-hp. d.c. permissible motor; new Spirakore transformers; glass-insulated magnet wire and coils; photographic display of rectifiers, electrical equipment for stripping shovels, etc.

51 GIBRALTAR EQUIPMENT & MFG. CO.: Lightweight steel track and repair tools (key-seaters, rail benders, punches, rerailers, car-stop, derailers); tool cart, grease gun, car wheels, etc.

52 GOODMAN MFG. CO.: Type 724-CJ permissible "gobber" with double cutter bar and conveyor attachment; 360-A track loading machine; Type 412-DA low-vein universal-control de luxe shortwall cutter; Type 512-DA universal-control de luxe shortwall with thin-kerf bar and No. 67 throw-away-bit chain; Type 612-AT permissible conveyor shortwall with 20-hp. motor and No. 64 throw-away-bit chain; G-20 shaker conveyor drive; H-12½-R reversible-type shaker-conveyor drive; E-11 shaker-conveyor drive; J-10 shaker-conveyor drive; G-12½ shaker-conveyor drive; G-12½ shaker-conveyor drive with connecting trough mounted; Type AOC automatic duckbill with Size O ball-bearing swivel trough and pendulum jack; Size O Angle Trough—90 deg.—with jack; a section of 9726 belt conveyor; sample sections of troughing.

53 GOULD STORAGE BATTERY CORPORATION: Kathanode "Glassclad" batteries for mine service, including permissible Joy shuttle-car battery.

54 GRUENDLER CRUSHER & PULVERIZER CO.: Gruendler crushers for coal sizing; also laboratory crusher and splitter.

55 GULF OIL CORPORATION: Scientific lubrication of mining equipment.

56 GUYAN MACHINERY CO.: G.M.C. portable arc welder; locomotive and mining-machine resistances; slip-ring-motor resistances; Gay bag-filling machine; lightweight inspection car.

57 HENDRICK MFG. CO.: Perforated screen plates of all types, including the new stainless-steel dewatering and overhanging flanged lip screens, grilles, grating, testing sieves, etc.

58 HERCULES POWDER CO.: Explosives and blasting devices for coal mines.

59 HOBART BROTHERS CO.: Electric arc welders.

60 IMPERIAL BRONZE MFG. CO.: Portable mine-car compressors, truck-mounted and skid-mounted; self-propelling air compressor, convertible for use as locomotive; rubber-tired compressor.

61 INTERSTATE EQUIPMENT CORPORATION: Illustrations of aerial tramways for refuse disposal.

62 I-T-E CIRCUIT BREAKER CO.: Improved Type KSC sectionalizing circuit breaker and Type KSA switchboard breaker for handling the d.c. end of a full-automatic substation; 300- and 600-amp. manual sectionalizing breakers and a load-distributor for motor-generator sets operating in parallel.

63 JEFFREY MFG. CO.: L-400 loading machine; 29U Universal cutting machine; 61-CL rubber-tired conveyor-loader; hand and post-mounted drills; "Aerodyne" fans; "Aerodyne" midget tubing blowers, Jeffrey-Traylor vibratory "Conveyanscreen" with the new Heller piano-wire cloth; Jeffrey-Traylor electric vibrating feeder; Type 35-BCS conveyor-type shortwall cutter, Jeffrey air-operated jig, "Flextooth" crusher for stoker coal, Jeffrey car puller; belt and chain conveyors; mining-machinery parts.

64 JOHNSON - MARCH CORPORATION: "Coalaid" for dustproofing coal.

65 JOY MANUFACTURING CO.: 11 BU Loader; new 14-BU high-capacity low-vein loader; new 3½- and 6-ton shuttle cars; new Joy hand-held coal drill.

66 KOEHLER MFG. CO.: Wheat electric cap and hand lamps; new individual-service charging rack; Koehler flame-safety lamps.

67 KOPPERS CO.: See Koppers-Rheolaveur Co., Wood Preserving Corporation.

68 KOPPERS RHEOLAVEUR CO.: Koppers Menzies coal washer; barge-loading plants; other preparation equipment and services.

69 LADEL CONVEYOR & MFG. CO.: LaDel-Troller 5-ft. high-pressure propeller-type mine fans; LaDel-Troller tubing blowers; U-12 side-drive shaker conveyor; other underground conveyors.

70 A. LESCHEN & SONS ROPE CO.: Standard and preformed wire rope for all mining applications.

71 LINK-BELT CO.: Working model of Roto-Louvre heat dryer; P.I.V. gear variable-speed transmission unit with remote control; automatic underfeed screw-type stoker; literature and photo murals of conveyors, Simon-Carves washers, rotary dumps and feeders, screens, loading booms, blending equipment, skip loaders, crushers, trough washers and shovels, draglines and conveyor-stacker for strip mining; samples of silent, roller, malleable and steel chains.

72 MCLANAHAN & STONE CORPORATION: New Black Diamond 18x24-in. single-roll, quick-adjusting crusher with automatic tramp-iron protection.

73 MCNALLY-PITTSBURG MFG. CORPORATION: Coal-preparation plants, equipment and services; McNally-Norton automatic washers; McNally-Norton vertical pick breakers; McNally-Pittsburg improved Vissac jig; McNally-Pittsburg Vissac heat dryer; new stoker coal breaker.

74 MACWHYTE CO.: Wire rope for all coal-mine service; wire-rope slings.

75 MANCHA STORAGE BATTERY LOCOMOTIVE CO.: Pictures and data on storage-battery locomotives.

76 MARION STEAM SHOVEL CO.: Photographs and data pertaining to coal-stripping and loading shovels.

77 METAL & THERMIT CORPORATION: Thermit-welding of mine tracks.

78 MINERS' EXHIBIT: Fifty interesting money- and labor-saving devices created by men at the mines.

79 MINE SAFETY APPLIANCES CO.: Streamlined Model "P" Edison electric cap lamp, trolley guard, combination welding shield and protective hat, portable rock-dust distributor for conveyor work, semi-portable rock-dust distributor also available with rubber-tired wheels, "Dustfoe" respirator, molded Bakelite lamp bracket for M-S-A Skullgards, explosives and detonator carrier, midget impinger for dust sampling, dust-counting microscope, microprojector for dust counting, methane alarm, hand-operated carbon-monoxide indicator, combination Skullgard-goggle assembly, "Speedframe" for welding goggles and a full line of safety first-aid and rescue equipment.

80 MORROW MFG. CO.: Full-sized 100-tons-per-hour-capacity Morrow-Prins coal washer.

81 MOTT CORE DRILLING CO.: Core drills and drilling service; pregrouting of shafts, tunnels and headings.

82 MYERS-WHALEY CO.: Whaley "Automat" loading machine with parallel-lift rear conveyor; new Whaley transfer car.

83 NACHOD & UNITED STATES SIGNAL CO.: Switch-position indicator with control relays; electric track switch; electric spring-switch control; "Nussco" automatic block-signal system; Davies "Safelectric" trolley pole; reflex trip markers; other signal relays, contactors, etc.

84 NAIL CITY BRONZE CO.: "Hi-Led-Loy" non-freezing bearings; high-strength titanium-bronze.

85 NATIONAL ELECTRIC COIL CO.: National "Mico-Glas"-insulated coils, other NEMA coils.

86 NATIONAL MALLEABLE & STEEL CASTINGS CO.: "Naco" mine-car hitchings and cast-steel wheels; "National" friction draft gear; Willison automatic couplers.

87 NATIONAL TUBE CO.: (subsidiary United States Steel Corporation): "Duroline" copper-steel pipe, scale-free pipe, copper-steel pipe, seamless boiler tubes.

88 NORDBERG MFG. CO.: Symons double-deck horizontal vibrating screens; "Rod-Deck" screens.

89 NORMA-HOFFMANN BEARINGS CORPORATION: Ball and roller bearings; pillow blocks; sealed cartridge bearings.

90 OHIO BRASS CO.: New safety feeder switch, wedge-type rail-bond, track drill for drilling holes for stud-terminal bonds, improved O-B automatic mine-car coupler, three new headlights with focusing arrangements, three-way junction box, M-6 section insulating switch, line-section switch in steel case, new AW-20 end-weld rail bonds, new split-terminal bond, automatic starters, Bulldog feeder clamp with mechanical clamping lug, automatic section-insulating switch, operated by trolley wheel; "Form-L" headlight resistance; complete line of overhead materials and supplies, insulators, etc.; new three-circuit junction box, open type, in interlocking case; new-type MF gasproof headlight resistance; fused trolley tap with ball tip; new gasproof conveyor controls; new trolley harp and shoe; new heavy-duty ground clamp for attachment to bonds.

91 OSMOSE WOOD PRESERVING CO. OF AMERICA: "Osmose" natural-pressure wood preservation.

92 OWENS-CORNING FIBERGLAS CORPORATION: Glass insulation.

93 PENN MACHINE CO.: Rail bonds, including new minimum length PM-10 "Super-Weld" joint bond; new removable bonds; "U" bonds; special alloy non-scoring bronze axle and journal liners; bushings and bearings for mine locomotives and mining machines; new-form "Stronger Tooth" hardened pinions for mine locomotives, with solid axle gears and other improved replacement parts.

94 PENNSYLVANIA ELECTRIC COIL CORPORATION: "Fiberglas" electric coils, Bakelite-insulated coils, synthetic heat-reactive varnish.

95 PHILCO RADIO & TELEVISION CORPORATION: "Philco" storage-battery cells, permissible Joy shuttle-car battery.

96 PITTSBURGH COAL CARBONIZATION CO.: "Disco" process for the production of smokeless fuel from fine coal.

97 PORTABLE LAMP & EQUIPMENT CO.: Protective equipment for coal miners, including the new Portable electric cap lamp; "Cool Caps" and "Cool Hats"; goggles, respirators and safety shoes; Koehler flame safety lamps; permissible shotfiring units; haulage safety devices, such as car stops, skids and derailers; switch signal devices; transition rails; first-aid cabinets; stretcher boards; pocket first-aid kits and other safety products; permanent reflector-button safety signs.

98 POST GLOVER ELECTRIC CO.: P-G steel-grid resistors, d.c. motor starters, transfer switches, K. & H. solderless terminals, "Promet" bronze heat-treated bearings and bushings, Universal cast-iron pipe, new P-G convection heater.

99 PRODUCTIVE EQUIPMENT CORPORATION: "Selectro" vibrating screens.

100 FRANK PROX CO., INC.: New "Twinpoint" ToolSteeL cutter bit; Prox "Invincible ToolSteeL" cutter chains.

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COAL AGE

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New York, N. Y.

101 PURE OIL CO.: Lubricating oils and greases; wire-rope dressings.

102 ROBERTS & SCHAEFER CO.: Stump Air-Flow coal cleaner; the improved hydro-separator; other preparation equipment and services.

103 ROBINS CONVEYING BELT CO.: New-type troughing belt conveyor idler with "triple check" bearing seals; new "rubber-disc" self-cleaning return idlers; automatic training idlers; model of 5x10-ft. double-deck Gyrex screen.

104 JOHN A. ROEBLING'S SONS CO.: Roeglas magnet wire and armature and field coils; wire rope and fittings of all kinds.

105 ROME CABLE CORPORATION: New "Rome 60" mining cables, welding cable and portable cords.

106 SAFETY FIRST SUPPLY CO.: Welder's safeguards, head-protecting helmets, Strauss safety belts, E. & J. resuscitators and inhalators, Willson "Super Tough" goggle lenses, first-aid kits and materials.

107 ST. LOUIS POWER SHOVEL CO.: Data on power shovels.

108 SANFORD-DAY IRON WORKS, INC.: Full-sized mine car showing new drop-bottom features; also ball-bearing "Floater" wheels.

109 SCULLY STEEL PRODUCTS CO.: Products of the United States Steel Corporation.

110 SHELL PETROLEUM CORPORATION: Lubricants, spray oils.

111 SIMPLICITY ENGINEERING CO.: Vibrating screens.

112 SKF INDUSTRIES, INC.: Antifriction bearings and appliances.

113 SOCONY-VACUUM OIL CO.: Gargoyle lubricants.

114 STANDARD OIL CO. (INDIANA): Lubricating oils and greases; new series of coal-spray oils.

115 STEPHENS-ADAMSON MFG. CO.: Operating model of new air-sand system for dry-cleaning coal; Redler elevators and conveyor-elevators; vibrating screens and belt carriers; ring-type crusher; "Saco" speed reducers; "Sealmaster" ball-bearing industrial units; J.F.S. variable-speed drives.

116 STERLING PUMP CO.: Deep-well and centrifugal pumps.

117 STREETER-AMET CO.: Automatic weighers and recorders for mine cars in motion; also trucks.

118 SULLIVAN MACHINERY CO.: "Auto Drill," a rubber-tire mounted self-propelled unit used in trackless mining systems; Improved "Super" shortwall, new "Two Speed" power truck, mine-car compressor, new SS-10 self-supporting rock drill, room hoist, car puller, hand-held drills, rope sheaves, vaporproof safety lighting cable, spot-heating cable splicer, cable vulcanizer, Miller cable connectors and replacement parts.

119 SUN OIL CO.: Lubricants and "Coalkotes" for dustproofing.

120 W. O. & M. W. TALCOTT, INC.: Conveyor-belt patch fasteners; conveyor and transmission belt fasteners.

121 TALLMAN MFG. CO.: Tallman rail benders and punches, car movers; track drills, levels and gages.

122 TAMPING BAG CO.: Machine for filling and packing tamping bags; "Seal-Tite" tamping bags.

123 TEMPLETON, KENLY & CO.: Complete line of Simplex mine jacks.

124 TENNESSEE COAL, IRON & RAILROAD CO.: Products of the United States Steel Corporation.

125 TIDE WATER ASSOCIATED OIL CO.: Tycol "Green Cast" grease applications in the coal-mining industry.

126 TIMKEN ROLLER BEARING CO.: Assortment of bearings for use in mine-car wheels, conveyors, pumps, loaders and other mining equipment, together with special dust collars, closures and typical wheel installations; display of typical Timken-equipped conveyor rolls.

127 TOOL STEEL GEAR & PINION CO.: "Tool Steel" gears and pinions for mining machinery, featuring "softending" of locomotive gear teeth.

128 W. S. TYLER CO.: New "Ty-Rock" rubber-mounted vibrating screen; Type 400 Tyler electric screen; screen-cloth.

129 UNION CARBIDE AND CARBON CORPORATION: (Haynes Stellite Co., Linde Air Products Co., National Carbon Co., Inc.): Linde oxygen; "Prest-O-Lite" acetylene; Union miner's lamp carbide; "Carbic" floodlights; acetylene generators; "Oxweld" welding and cutting equipment; "U.C.C." methane indicator; "Prest-O-Lite 5 in 1" torch; CM-16 cutting machine; hard-faced coal bits for undercutters; carbon brushes for motors and generators.

130 UNION WIRE ROPE CORPORATION.: Wire rope for mining.

131 UNITED ENGINEERS & CONSTRUCTORS: Chance coal-cleaning system.

132 UNITED STATES BUREAU OF MINES: Prevention of injuries in mines, particularly from falls of roof, explosions and haulage.

133 UNITED STATES RUBBER CO.: U. S. Royal mining-machine cable; U. S. Royal concentric cables featured in display.

134 UNITED STATES STEEL CORPORATION OF DELAWARE: See under subsidiaries (American Steel & Wire Co., Carnegie-Illinois Steel Corporation, Columbia Steel Co., Cyclone Fence Co., National Tube Co., Scully Steel Products Co.; Tennessee Coal, Iron & Railroad Co.).

135 WATT CAR & WHEEL CO.: New greasing car; new "Equalizer" mine car; new horizontal drilling machine for mine drainage.

136 WEBSTER MFG. CO.: Coal-tipple equipment.

137 WEIR KILBY CORPORATION: Various units used in modern mine-track construction: frogs, switches and switch stands.

138 WESTERN CARTRIDGE CO.: Western blasting caps.

139 WESTINGHOUSE ELECTRIC & MFG. CO.: Standard and explosion-proof controls and motors; dustproof motor; gearmotor; line material; insulating material; capacitors; new automatic sectionalizer.

140 WEST VIRGINIA RAIL CO.: Newly developed sectional turnout for mechanized mining; steel ties, manganese and safety frogs, lightweight "Quick" rail benders.

141 H. KIRK WHITE & CO.: Water-soluble aluminum paint, "So-Wite" hand cleaner and "Miners' Special" liquid soap.

142 WOOD PRESERVING CORPORATION: "Ar-moored" mine ties; preparation of wood for preservative treatment.

Circle on the card below the numbers of the companies on which additional information is desired. No obligation. The card requires no postage.

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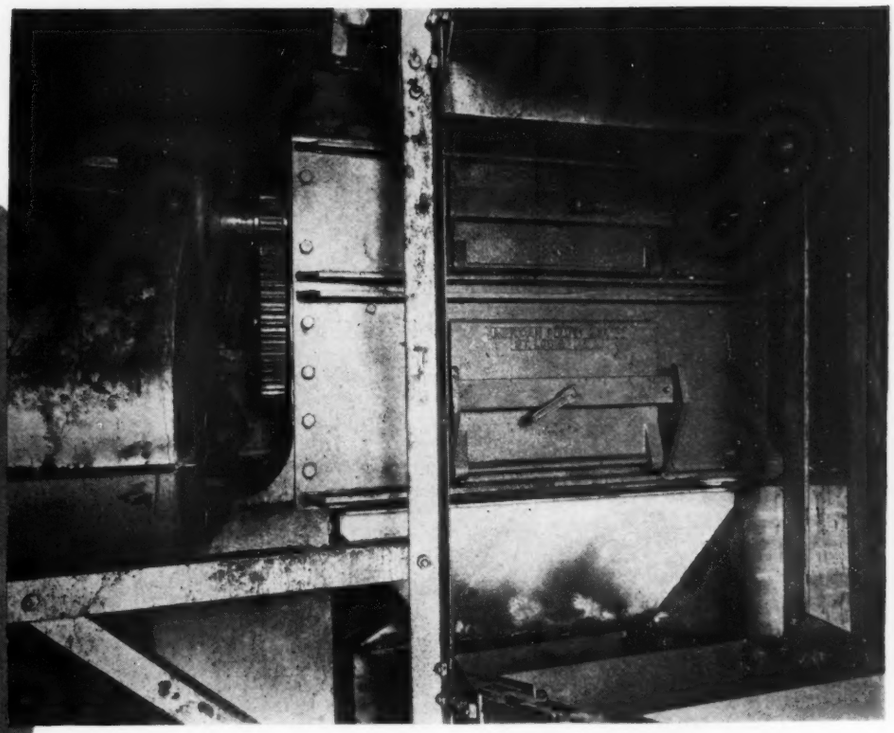
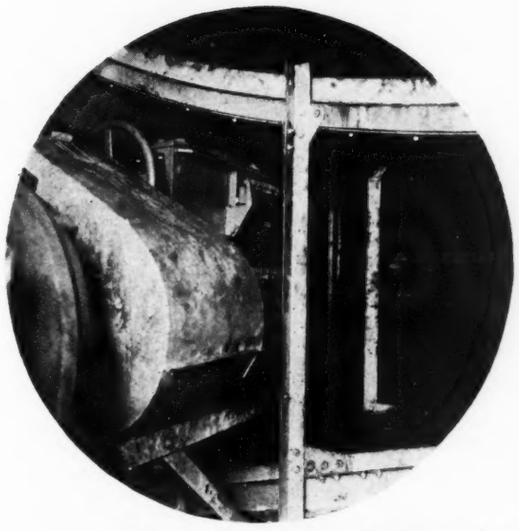
★ *The Roller Shredder Ring Principle* makes it possible to split the coal instead of shattering it by impact, assuring uniform size of crushed coal and reducing fines to an absolute minimum.



Read WHAT AN OPERATING OFFICIAL OF A LARGE ILLINOIS PRODUCER Says

"We are using two of your AC3-B American Rolling Ring Coal Crushers for producing domestic stoker product. These two Crushers, at different mines, are crushing 2x1" and 1½x¾" to a product ¾" and under at the rate of approximately 235 t. p. h., and also reducing 2x5/16" to a product 5/16" and under at the rate of 150 t. p. h. They are driven by 125-HP motors. These crushers are more than fulfilling our expectations both in tonnage produced and in quality results in crushing to size. As a good capital investment they have our full endorsement."



Picture shows conveyor feeding coal to crusher and lower conveyor taking away crushed sizes.

THE AMERICAN *Rolling Ring* COAL CRUSHER

PATENTED

- is an economical and flexible unit
- its power requirements are reduced to a very low figure
- its dependable operation saves on maintenance

Find out how you can use it and save more money

Write us regarding your coal sizing problems. Our engineers will be glad to tell you the complete facts about this crusher and how its engineering features work to your benefit. Names and addresses of many prominent users furnished promptly on request.

AMERICAN PULVERIZER COMPANY 1119 MACKLIND AVENUE ST. LOUIS, MISSOURI

ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

operations, many producers found it difficult to secure enough business to keep their mines running. Many, too, reported that some of their customers had shifted to oil or natural gas during the suspension.

New Arthracite Pact Signed

Representatives of operators and union mine workers in the anthracite region of Pennsylvania continued to hold sessions in the Engineering Societies Building, New York City, reaching an accord on May 27. Mr. Lewis won a "union-shop" contract with continuation of the existing scale of wages and hours. Pending a final accord, the old pact, which expired April 30, was extended from week to week. A subcommittee of two operators and an equal number of miners, appointed May 20 to draw up a new agreement, included the following: James H. Pierce, president, Monarch Anthracite Mining Co.; Ralph E. Taggart, president, Philadelphia & Reading Coal & Iron Co.; Thomas Kennedy, secretary-treasurer, United Mine Workers, and Martin F. Brennan, president of District 9, U.M.W.

Iron Producer to Develop Coal Properties

About 200 acres of coal property in Boone County, West Virginia, owned in fee, is to be developed by the Peerless Coal & Iron Co. The coal produced will be principally used for making coke for blast furnaces in the production of pig iron, and the coal retorts will be so designed as to give such byproducts as tar and gas. Improvements now on the property include a tipple with facilities for loading on three railroad tracks, making it possible to run graded sizes of coal; also 28 houses equipped for gas, water and electricity. Depending on freight rates, which have not been definitely determined, the company may decide to purchase 8,000 acres of coal land about 15 miles from Marlinton, which also would be used to supply the demands for the company's blast furnaces.

The Peerless company holds approximately 97,000 acres of iron-ore and mineral lands in Greenbrier and Pocahontas counties which it will mine for the production of pig iron. Preliminary construction was scheduled to begin about May 20, with completion of the plant by Nov. 1. Rush Meadows, geologist and mining engineer, Charleston, W. Va., is chief engineer for the company.

Conspirators Resentenced

The U. S. Supreme Court having refused to review a Circuit Court decision upholding their convictions, 34 Illinois Progressive miners convicted of a conspiracy to obstruct the mails by bombing railroads (*Coal Age*, January, 1938, p. 104; February, 1939, p. 94, and April, p. 101) were resentenced on May 10 by U. S. District Judge Charles G. Briggle at Springfield, Ill. The men were given two years in prison and fines of $10,000 each, in accordance with the Circuit Court's decision reducing the penalties from four years and $20,000.

Completion of Efforts for Coal Control To Be Based on Commission's Work

By PAUL WOOTON
Washington Correspondent, Coal Age

AS A RESULT of the President's reorganization order the Secretary of the Interior has inherited the New Deal's thorniest task. The tail of a wildcat has been forced into his hand. There is no evidence that the Guffey act is being abandoned or that its operations are being delayed. As this is written (May 13), there is no intimation as to who will direct work under the Guffey act in the future.

For twenty years public opinion has been trending more and more in Washington toward regulation of the coal industry. Since 1916 there has been a continual series of legislative investigations and studies by special commissions. The conviction among officials has been growing that in dealing with this exhaustible natural resource, which the courts have held to be affected with the public interest, regulation or supervision of some form is necessary.

The problem has been to permit collective action among competitors so that the industry could take common counsel and restrain the bad effect of cutthroat competition. That this could be done legally was first established in the decision of the Supreme Court in the Appalachian Coals case. Of more practical importance, however, was the experience of the industry under NRA. It soon became clear that NRA was wholly out of place in so far as it applied to local industries or businesses. With respect to the bituminous coal industry, however, NRA impressed many as being a great forward step. NRA recognized the fact that some form of collective action among competitors was necessary and that under the American system it had to be carried on under public supervision to make sure that the rights of the consumer were safeguarded. The bituminous coal code swept away many ancient evils. It resulted in the establishment of collective bargaining throughout the industry and it allowed the operators to organize themselves in an effective way. The code brought about a considerable degree of stabilization in the industry.

The Supreme Court, however, said that Congress could not authorize action of that sort without clearly defining standards and without vesting responsibility for the policing and the enforcing of those standards.

Pattern of NRA Copied

As a result of the experience with NRA mine workers and a substantial majority of operators wanted to be allowed to follow such lines. This demand resulted in the Guffey act. The law was built directly on the experience under the NRA code. Some said it would be necessary to have production control. This contention had been pressed at the beginning of NRA. Against that contention was the claim that the coal industry was not ready for quotas. In addition, it was doubtful if Congress had the power to set up quotas. As a result the problem was approached by providing for the establishment of fair minimum prices and marketing rules which would outlaw unfair trade practices.

After taking this plunge into the field of public regulation a multitude of issues arose. First was the question of constitutionality. The courts held that the labor features of the 1935 Guffey act were unconstitutional. That issue was disposed of by the National Labor Relations Act and the decision of the Supreme Court sustaining that law. Then came the second Guffey act, which was held constitutional. Still there remained the question as to whether the direct fixing of minimum prices would be the best approach to the problem. It was decided that the only way to find out was to try it.

The idea of minimum prices is not the only feature of the law. If the final verdict should be, after a year or so of trial, that the minimum prices are not the best approach, the law suggests two alterna-

Coal Commission Abolished In Reorganization Plan

President Roosevelt's second Reorganization Plan, sent to Congress on May 9, provided for abolition of the National Bituminous Coal Commission, transfer of its functions to the Department of the Interior, and abolition of the office and transfer of the functions of the Consumers' Counsel to the Interior Department. A resolution of disapproval, introduced by Senator Byrnes to force a vote, was defeated on May 12 without a roll-call vote. By the terms of the Reorganization Act, it now becomes effective in 60 days, but Senator Byrnes said he expected to introduce a joint resolution authorizing the President to make the plan effective within 30 days.

In a statement to Congress accompanying the plan the President said, in part: "I find it necessary and desirable, in order to accomplish the purposes of the Reorganization Act, to abolish the National Bituminous Coal Commission and to transfer its functions to the Secretary of the Interior. Thus the task of conserving the bituminous-coal resources of the country may be carried on directly by the head of the department principally responsible for the conservation of fuel and other mineral supplies. The Congress placed this commission in the Department of the Interior, but experience has shown that direct administration will be cheaper, better and more effective than through the cumbersome medium of an unnecessary commission."

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tives. One is the organization of marketing agencies. Sec. 12 of the statute authorizes the creation of marketing agencies and authorizes them to enter into agreements with one another under the supervision of the Coal Commission. There are those who think marketing agreements provide a much better approach.

The other alternative is through the setting of market quotas. The law instructs the Commission to investigate and report on the allocation of quotas. Until the Supreme Court handed down the tobacco decision there was an academic question because all of the precedents seemed to indicate that Congress did not have the authority to set quotas. The tobacco decision, however, makes it clear that Congress can authorize a system of marketing quotas giving each shipper his fair share of the total available tonnage. In other words, the Guffey act contains its own provisions for evolution.

The law was passed in April of 1937, to run for four years. The commission got off to an incredibly bad start. In its early months particularly the Commission was preoccupied with patronage. This resulted in numerous purely political appointments. It seemed not to realize that every time a bad appointment is made, even in the lower salaried brackets, the weak spot is certain to manifest itself. While poor judgment was used in the selection of some of the members of the Commission, it would not be accurate to assume that the difficulties of the agency were due wholly to that fact. Some of the men who served with the Commission measure up to the average in ability that has existed during the past twenty years, for instance, on the Interstate Commerce Commission or the Federal Trade Commission.

Huge Task Presaged Trouble

While the action of the President in abolishing the Commission indicates that he was far from pleased with his own appointees, it would be an injustice to assume that the difficulties of the Commission were due wholly to the shortcomings of members of the Commission. They were given a job that would have taxed the ablest group that could have been appointed. Despite the unusually large number of ward heelers, the key men and many of their assistants were exceptionally well chosen. The Commission had good lawyers. There were many good men in the marketing division. They had one of the best men in the country on costs and some exceptionally able technical advisers. They worked Saturdays, Sundays and holidays in their efforts to master the problems of a pioneer field.

The President thinks the law can be administered better under the Secretary of the Interior than under a commission. The problem now is to carry on without loss of time. Since the work of establishing minimum prices is so nearly completed, the obvious thing would seem to be to build on the work the Commission has done and push through to completion the complex and difficult job. The principal hope of those who want to see no delay is that Secretary Ickes will utilize the experienced and capable part of the personnel which has been working under the Commission. The job is not one that can be undertaken by amateurs. It is as difficult and as complex as that of the ICC.

The transition to new auspices raises some obvious legal problems. If the hearings which were begun under the commissioners are to be taken over and completed, Secretary Ickes must name someone promptly to direct that work. It is obviously his duty to get out the minimum prices at the earliest possible time. Then looms the very difficult job of enforcing the prices. There is much more to be done on the marketing agencies. Many want to see them actively encouraged in all districts. When they are set up and going they ought to be able to reinforce the system of minimum prices. There are many who think marketing agencies can accomplish a great deal without minimum prices. Many hope that the Secretary of the Interior will explore the idea of tonnage quotas and be ready to report at the next session of Congress on the advisability of undertaking marketing quotas made possible by the Supreme Court decision in the tobacco case.

From what can be learned around the Interior Department it is possible that the regulatory features of the act will be separated and handled by a different agency from the purely fact-finding provisions of the law. It is known that the Bureau of Mines has insisted upon retaining its traditional character as an impartial fact-finding agency.

Move to Enforce Labor Edict

The National Labor Board filed petitions in the U. S. Circuit Court of Appeals at Cincinnati, Ohio, on May 6 for enforcement of the Wagner act against the Stearns Coal & Lumber Co., Stearns, Ky. The Board ordered the company on Feb. 18 to desist from discouraging membership of its employees in the United Mine Workers, District 19, or any other labor organization. It also demanded the reinstatement of certain employees and payment of $14,750 in back wages.

Coming Meetings

- American Retail Coal Association: annual convention, June 6-8; exposition, June 3-11; Sherman Hotel, Chicago.
- Illinois Mining Institute: 21st annual boat trip and summer meeting, June 9-11, aboard Str. "Golden Eagle," leaving St. Louis June 9 and returning June 11.
- Smoke Prevention Association, Inc.: 33d annual convention, June 13-16, Hotel Schroeder, Milwaukee, Wis.
- Mining Society of Nova Scotia: 52d annual meeting, June 21 and 22, Pictou Lodge, Pictou, N. S., Canada.
- Rocky Mountain Coal Mining Institute: 37th annual meeting, June 22-24, Hotel Utah, Salt Lake City, Utah.
- Pennsylvania Anthracite Section, American Institute of Mining and Metallurgical Engineers: summer meeting, June 30, Irem Temple Country Club, Dallas, Pa.
- Southern Wyoming Coal Operators' Association: annual meeting, July 11, Cheyenne, Wyo.

Holmes Awards Bestowed For Safety Achievements

Certificates in recognition of extraordinary safety achievement during 1938 were awarded late in April to 66 coal mines or mining companies by the Joseph A. Holmes Safety Association at its annual meeting in Washington, D. C. Medals also were presented to nine individuals and certificates to four others for saving lives at coal mines. Certificates went to 30 for long-time service in promoting health and safety in mining. The meeting was held in the conference room of Dr. John W. Finch, director of the U. S. Bureau of Mines, who also is president of the association.

The companies and mines receiving certificates are: American Smelting & Refining Co. (Boncarbo mine and coke plant), Cokedale, Colo.; Calumet Fuel Co. (Somerset mine), Somerset, Colo.; Carter Coal Co. (Olga Nos. 1 and 2 mines), Coalwood and Caretta, W. Va.; Colorado Fuel & Iron Corporation (Morley and Rockvale No. 3 mines), Morley and Canon City, Colo.; Columbus Mining Co. (Columbus No. 9 mine), Combs, Ky.; Consolidated Coal Co. (No. 7 mine), Herrin, Ill.; Consolidation Coal Co. (Nos. 32, 63 and 97 mines), Owings, Monongah and Rivesville, W. Va.; Consumers Mining Co., Wheeling W. Va.; Crescent Mining Co. (No. 1 mine), Pekin, Ill.; Diamond Coal Co., Providence, Ky.; Dick Coal Co. (Dix mine), Boncarbo, Colo.

Ford Collieries Co., Curtisville, Pa.; Franklin County Coal Corporation (Nos. 5 and 7 mines), Freeman and Royalton, Ill.; Gay Coal & Coke Co. (No. 1 mine), Mount Gay, W. Va.; Guyan Eagle Coal Co. (No. 1 mine), Amherstdale, W. Va.; Hillman Coal & Coke Co., Pittsburgh, Pa.; Industrial Collieries Corporation (No. 42 mine), Dakota, W. Va.; Island Creek Coal Co. (Nos. 20, 21 and 7 mines), Whitmans and Holden, W. Va.; National Mining Co. (No. 1 mine), Morgan, Pa.; Howard Collieries (Junior mine), Chattaroy, W. Va.; Northwestern Mining & Exchange Co. (Kramer and Oyster mines), Stump Creek and Brockport, Pa.; Peabody Coal Co. (No. 7 mine), Kincaid, Ill.; Pryor Coal Mining Co. (Pryor mine), Pryor, Colo.; Pyramid Coal Corporation (Pyramid mine), Pinckneyville, Ill.; Republic Steel Corporation (Davidson and Sayreton mines), Connellsville, Pa., and Sayreton, Ala.; Rex Coal Co. (No. 2 mine), Eldorado, Colo.

Stonega Coke & Coal Co. (Stonega and Arno mines), Stonega and Arno, Va.; Superior Coal Co. (Nos. 1, 2 and 4 mines), Gillespie, Ill.; Union Pacific Coal Co. (No. 1, "B," "C" and Hanna mines), Reliance, Superior and Hanna, Wyo.; Valier Coal Co. (No. 1 mine), Valier, Ill.; Westmoreland Coal Co. (No. 1 and Export mines), Claridge and Export, Pa.; Blue Diamond Coal Co. (Blue Diamond mine), Blue Diamond, Ky.; Carrs Fork Coal Co., Allock, Ky.; Colorado Fuel & Iron Corporation (Kebler mine), Tioga, Colo.; DeBardeleben Coal Corporation, Birmingham, Ala.; Indian Creek Coal & Coke Co., Indian Head, Pa.; Kelleys Creek Colliery Co. (Nos. 1, 2, 4 and 6 mines), Ward, W. Va.; Koppers Coal Co. (Ingram Branch mine), Wriston, W. Va.; Pursglove Coal Mining Co. (No. 2 mine), Pursglove, W. Va.; Red Jacket Coal Corporation (No. 32 mine),

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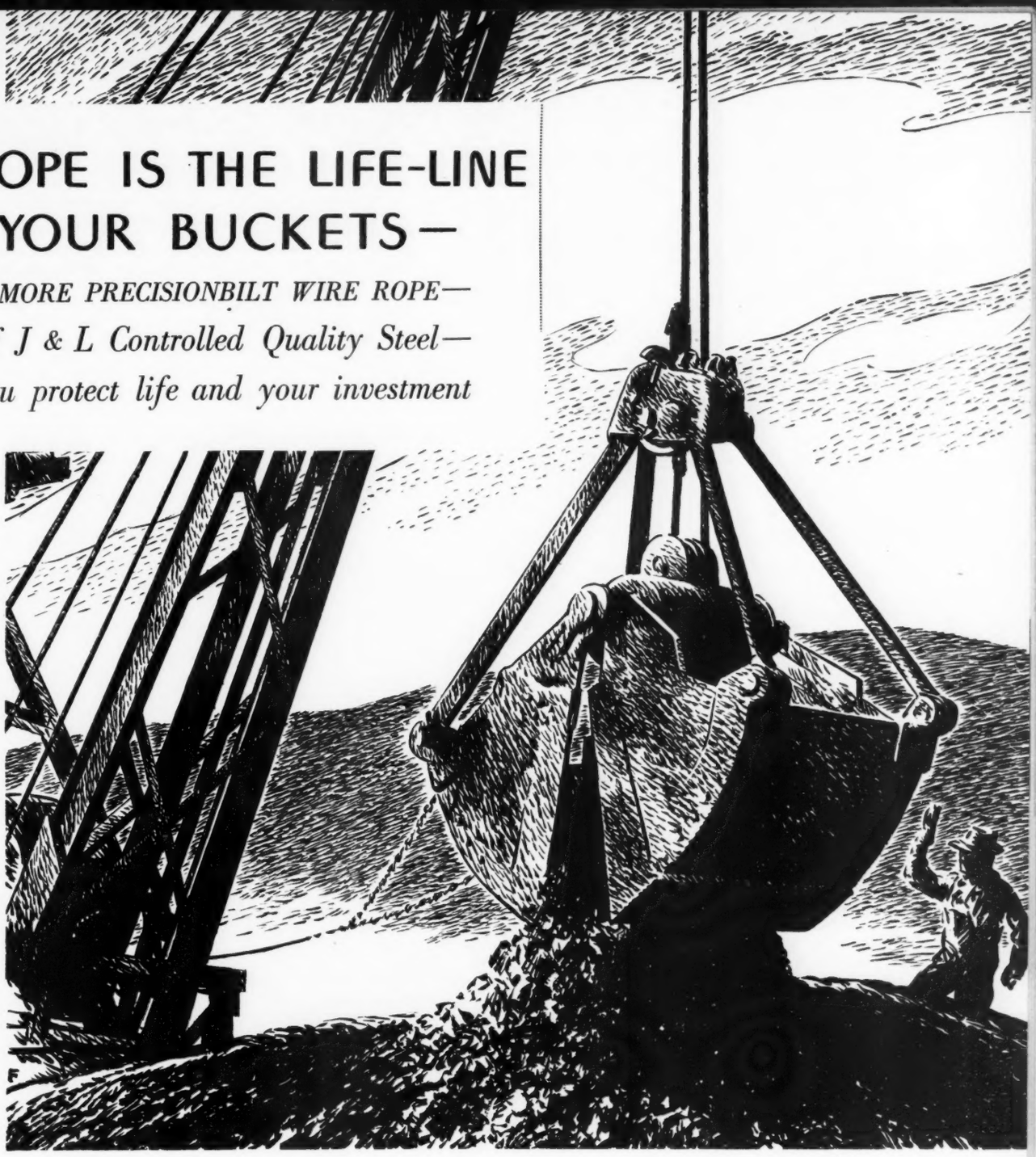

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Red Jacket, W. Va.; Red Parrot Coal Co. (Nos. 4 and 5 mines), Prenter, W. Va.; Stanley Coal Co. (Banner mine), Crellin, Md.; Winding Gulf Collieries (Nos. 1 and 2 mines), Winding Gulf, W. Va.; Windsor Power House Coal Co. (Beech Bottom mine), Windsor Heights, W. Va.

Medals for the saving of lives were given to Grover Jarrett and E. Z. Baskin, Winifrede Collieries, Winifrede, W. Va.; Oliver Busby, Wylam, Ala.; Dr. Jesse Maddox and Dr. John D. Maddox for work at Esry coal mine, Moberly, Mo.; Sam Guarino, Tennessee Coal, Iron & Railroad Co., Pratt City, Ala.; Joe Zuniga and William Paterson, Hayden Coal Co., Haybro, Colo., and Henry E. Cooper, Blue Diamond Coal Co., Eagan, Tenn. Certificates for life saving were awarded William Vickers, Tennessee Coal, Iron & Railroad Co., Wylam, Ala.; Tom Carradine, Alabama By-Products Corporation, Praco, Ala.; and Theodore Coet and Arthur Colinski, Russell Coal Co., Frederick, Colo.

Certificates for service in the promotion of health and safety in mining were bestowed on J. A. Atkinson, Lillybrook Coal Co., Killarney, W. Va.; Martin V. Collier, Stonega Coke & Coal Co.; C. C. Conley, Koppers Coal Co.; Tom Davis, West Virginia Coal & Coke Corporation, Omar, W. Va.; W. G. Dickson, Albert Lecunsky and William Sherman, New River Co., Mount Hope, W. Va.; George W. Dillard, Kanawha Coals, Inc., Hugheston, W. Va.; R. F. Embleton and William Kerwood, Jackson Coal & Mining Co., Hartford, W. Va.; G. E. Fox and C. F. Morris, McKell Coal & Coke Co., Glen Jean, W. Va.; John Hague, Howard Collieries Co.; John E. Holmes, Union Pacific Coal Co.; James Miekle, Dacono, Colo.; Robert Muir, Wheelwright, Ky.; Lewis Quenon, Crescent Mining Co.; Nicholas Richards, McNeil Coal Corporation, Dacono, Colo.; L. A. Snead, Kanawha & Hocking Coal & Coke Co., Longacre, W. Va.; Frank Trinkley, John Yuranich, Peter P. Sharon, W. M. Richardson and H. L. Townsend, Industrial Collieries Corporation; John Pinkerton, Hill-Anderson Co., Willis Branch, W. Va.; Charles E. Morris, Hudson Coal Co., Dickson City, Pa.; Harry Clark, Northwestern Mining & Exchange Co., Stump Creek, Pa.

W.V.U. Short Course in Mining

The 27th annual short course in coal mining will be held by West Virginia University June 5 to July 15, according to an announcement by C. E. Lawall, director of the School of Mines of the university. Classes will be held at the university, Morgantown; Beckley Junior High School, Beckley, and Logan High School, Logan, W. Va. Tuition will be free and the only entrance requirement is an ambition to get ahead.

National Fuel Moves

The National Fuel Co., with operations at Louisville and Puritan, Colo., has moved its Denver headquarters to the Equitable Building.

Lehigh University Conference Visualizes Rebirth of Anthracite Industry

MUCH hope for a revival of the anthracite region lies in the prospect of a reestablishment of hard coal as a metallurgical fuel. Return of the iron industry to the east of the anthracite region or its immediate neighborhood is said to be imminent, because certain recent technological advances in iron-ore concentration, the exhaustion of the best western ores and the suitability of anthracite for blast-furnace operations conspire to favor the re-migration of the industry to its former habitat. Gas production furnishes another important outlet for anthracite.

In agriculture, gardening, lawn making, fruit growing, etc., anthracite ash is valuable as a means of reducing erosion, aiding root penetration, increasing moisture absorption and retention and suppressing gall-producing thread worms which destroy trees. For this reason, the ash of anthracite from domestic furnaces may be regarded as an asset rather than as a nuisance. These and other advantages and market-extension possibilties, discussed at the Second Annual Anthracite Conference of Lehigh University, held in the Packard Laboratory Auditorium, Bethlehem, Pa., April 28 and 29, left an impression that a resurgence in the anthracite industry was assured.

Use of anthracite as a metallurgical fuel, declared Ralph H. Sweetser, consulting engineer in blast-furnace practice, Stuart, James & Cooke, had dropped in 1938 to 205,000 tons, of which 44,900 tons was used for sintering (broadly a sort of coking of ores, which by heating gives them coherence without preliminary melting), 30,700 tons for recarburizing (adding carbon to iron), and 123,000 tons for zinc reduction. Yet at one time anthracite was used extensively for smelting.

Suggestions for Anthracite Revival Promulgated at Lehigh Conference

Reestablishment of iron and steel industry near or east of region with substitution of anthracite for coke.

Replacement of preference for rival fuels, based on freedom from ash, for a preference for anthracite because of the proved value of coal for improvement of consumer's soil and in manufacture of soil-cinder concrete from both industrial and domestic anthracite ash, briquetted ash, clay brick, refractories insulation, and sound-deadening material.

Increased use of producer gas made from anthracite.

Greater acceptance for anthracite resulting from gravity ash disposal, convenience of burning equipment and thermostats.

Use of anthracite by chefs, also in cook stoves by small consumers throughout the year, also in open grates and fireplaces and, commercially, in underfeed and even in chain-grate stokers.

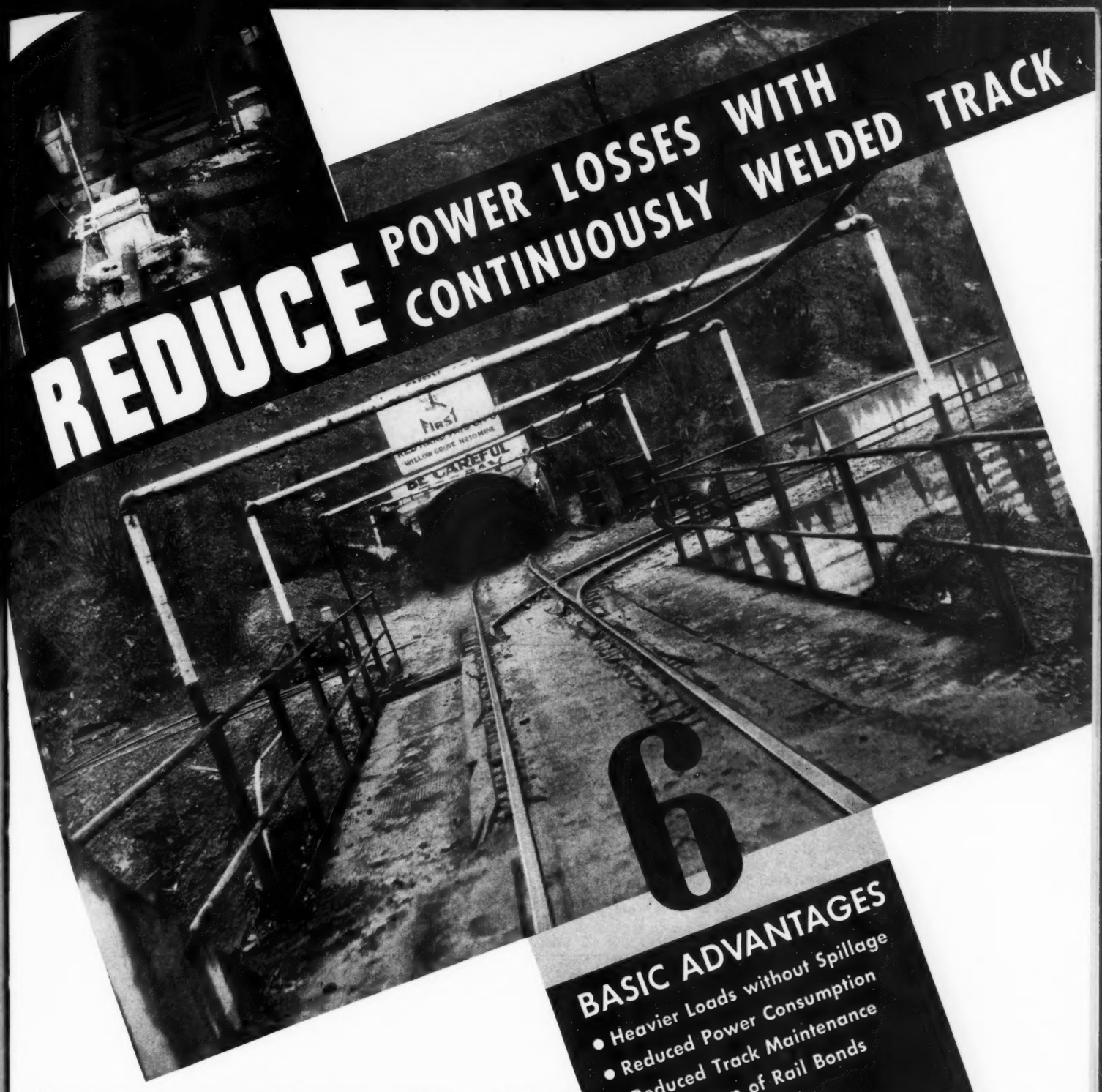
Venturesome anthracite men in 1840 brought David Thomas to America from Wales to show them how to use anthracite in blast furnaces. He established the first continuing commercial operation at Catasauqua in that year, but, as the furnaces of those days were suited to a soft fuel like charcoal, the new furnaces had to be of a new type to suit anthracite, which is both hard and dense. Similarly, furnaces for anthracite will have to be different from those designed for use of byproduct coke. Anthracite and charcoal both reached their peak as metallurgical fuels in 1890. In 1891 was erected the last blast furnace that used anthracite.

Bureau of Mines officials have declared, said Mr. Sweetser, that anthracite is more combustible than coke. Blast furnaces that would give anthracite the same advantages as have been given to byproduct coke never have been used for anthracite, so the relative value of the two fuels in actual practice has not been determined. Keene, Turner and Scott found that the reactivity of anthracite lies somewhere between charcoal and byproduct coke, with charcoal as the most reactive fuel. Because of its smoothness, the entire surface of anthracite is exposed to the blast; it is not like coke, which is full of protected recesses or pores; it has twice as much substance per cubic inch as coke and has even more strength to support the weight of the material in the furnace.

Anthracite Furnaces Were Many

In 1890, anthracite was used by 173, charcoal by 135, and raw bituminous coal or beehive coke by 243 blast furnaces. The introduction of byproduct coke, the discovery of the western hematites and the building of railroads caused the transference of the blast-furnace industry to points west of the anthracite region. Now that magnetic concentration recently has been applied to the finely ground magnetites of the Adirondack region, northern New Jersey and the Cornwall district of Pennsylvania (which may contain as much as 69 and 70 per cent iron), and now that it has been discovered that these ores can be sintered (preferably using as fuel for that purpose, anthracite fines), and that a form of ore most desirable for a blast furnace thereby can be obtained, the prospect of a revival of the iron industries to the east of the crest of the Alleghenies seems assured. Anthracite today is a better fuel than before—better cleaned, better sized. In this generation, said Mr. Sweetser, we probably would use egg coal for smelting. It should have no more than 8 per cent ash.

Anthracite is a good combustible for use in a gas producer, becauses it is noncoking and yields a gas uncontaminated with tar, urged Eric Sinkinson, associate professor of fuel technology, Lehigh University. By regulating the temperature of the air blast and providing for its saturation with steam at that temperature, the steam content of the air can be made such that the temperature of the furnace will not be high enough to cause clinkering, even when the coal has a rela-



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tively low fusion point. This is so because the reaction of steam with carbon is one which lowers the temperature of the producer, whereas the reaction with oxygen greatly increases the temperature of the coal.

With air alone above 2,192 deg. F. (1,200 deg. C.), carbon monoxide would be formed instantly with a liberation of 30 per cent of the heat energy of the anthracite. At 2,552 deg. F. (1,400 deg. C.), the gas formed would be 35 per cent carbon monoxide, ½ per cent carbon dioxide and 64½ per cent nitrogen. The temperature is lowered by steam-saturated air at 130 deg. F. Above this air-blast temperature, not all the steam would be decomposed. With less steam, working conditions are adverse, and the gas is not improved.

A water-jacketed cylindrically shaped refractory-lined steel furnace, 8 to 10 ft. in diameter, is used in the Wellman-Galusha anthracite gas generator. The jacket lowers the temperature of the coal, preventing clinkering, and produces steam for use in the furnace; the grate consists of three concentric rings shaped as if cut out of the same plate, the middle ring raised a little above the outer ring and the top ring raised above the middle ring. As the grate is revolved eccentrically the gyratory motion causes ash falling from the fire to be positively expelled in the openings between the rings into the ash-pit. Ash on the grate rings protects them from excessive heat.

A solid sealed bottom to the ash hopper permits a blast to be used of a few pounds pressure per square inch, thus overcoming the resistance of the fuel bed, which may be as much as 42 in. thick. Average analysis of the gas by volume is: carbon monoxide, 24.1 per cent; hydrogen, 16.6; methane, 0.8; carbon dioxide, 5.0; oxygen, 0.2; and nitrogen, 50.3 per cent. With the specific gravity of air taken as 1.0, that of the gas is 0.86; heating value is 151 B.t.u. per cubic foot at normal temperature and pressure. Yield is about 73 cu.ft. per pound of dry anthracite or 11,032 B.t.u. per pound of the original anthracite. Thermal efficiency of gasification, allowing for energy losses in drawing gases through the system and based on the lower or net calorific values of fuel and gas, usually is between 79 and 80 per cent. The gas is being used to avoid scaling of the product in wire-mill operations, by a biscuit company, also for malleable annealing kilns, tunnel kilns and galvanizing kettles.

Cities Use Mountains of Cinders

About a million cubic yards of sand-cinder concrete is used annually in New York City alone, and the rest of the country consumes about an equal quantity, quoted Raymond C. Johnson from a statement of the U. S. Bureau of Mines in 1932. According to E. Christensen, sand-cinder concrete displaces 500,000,000 brick annually. The Bureau of Public Works of Philadelphia reported that the ashes in the city dumps contain about 26 per cent carbon. The loss of carbon in the ash when compared with that in the original coal would run from 4 to 6 per cent only, as the weight of the coal before burning is several times that of the ash which remains after burning.

About six million tons of anthracite ash is produced in five States—New York, Pennsylvania, New Jersey, Massachusetts and Connecticut—about half from steam sizes, and hence is available in large quantities from each individual source. Ash from household furnaces comes in small quantities and is not strong enough for cinder concrete but it has enough carbon for re-forming by a sintering process. Corlite, a lightweight aggregate, is made by chemically treating anthracite ash, adding a flux and sintering the mixture. The heat produced in sintering can be used to generate steam.

Ash mixed with 10 per cent lime and water can be formed into a brick under several thousand pounds pressure per square inch, which must then be cured for hours under moderate steam pressure, becoming an unshrunk brick of calcium aluminum silicate which can be sold either in natural colors or may be pigmented before processing. Anthracite ash can be mixed with clay, and the coal present will aid in the firing of the brick. White ash from anthracite has possibilities for refractories, and domestic anthracite ash for heat-insulating and sound-proofing.

Anthrafilt Takes Long Voyage

A shipment of Anthrafilt, one of the smallest sizes of anthracite, bound for Bahrein, an island in the Persian Gulf off the east coast of Arabia, was aboard the Str. "Steel Traveler" when it left Brooklyn on April 28. The shipment, which is consigned to the Bahrein Petroleum Co., Ltd., said Louis C. Madeira, 3d, executive director of the Anthracite Institute, "will be used for water-purification purposes, as a filter medium in place of sand, in spite of the millions of tons of sand near by and locally situated on the island itself."

Ash Outlasts Fertilizer

Coal ashes placed at the foot of fruit trees and other plants prevent the formation of nematode (thread worm) galls. Anthracite ash maintains the porosity of turf and has a far more permanent effect than more expensive organic materials which in several years' time disappear from the soil. A mixture of 25 per cent of ash with heavy clay soils completely prevents cracking, reduces erosion, and facilitates cultivation. Before treatment, when wet, the soils are too sticky for cultivation and, when dry, unworkable, because baked so hard. Rain enters the treated soil and does not run off; thus erosion is prevented. Tests of vegetal growth in crocks containing anthracite ash and soil and so glazed as to prevent loss of soluble matter showed that anthracite ash has no toxic action.

In the anthracite region, grass and bushes grow freely on ash banks. However, anthracite ash is not recommended as a fertilizer. There are laws defining fertilizers as containing nitrogen, phosphorus and potassium, but anthracite ash does not contain enough of any of these elements to be considered a fertilizer; nitrogen is present only in the unburned coal. Mixing, with a clay soil, anthracite ash, humus, anthracite silt and sand, in four separate glazed pots, the mixtures showed results in vegetal growth in the order named, with anthracite ash by far the most prolific and most drought-resistant.

In discussion, Dr. Johnson declared that so little lime is present in coal ashes that they are made a little acid by the oxidation of the sulphur. No effort had been made to ascertain the value of the rarer minerals in anthracite ash. Copper aids vegetation and manganese prevents dry rot. To ascertain the advantages of such minerals comparison would have to be made with ashes without such elements. Though 35 to 36 per cent of the ash is alumina, it is not rich enough for profitable conversion to aluminum. Objection is raised to bituminous-coal ash for concrete aggregate not alone because of the possible expansion of the unburned coal, which might break the cement bond, but because it usually contains much more of the sulphur oxides, which will attack structural iron with which they come in contact.

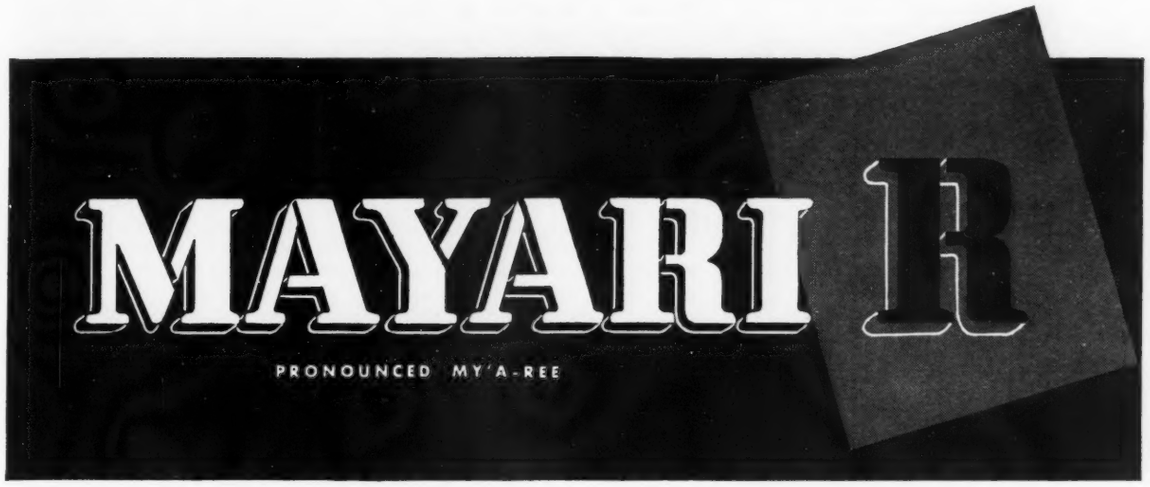
Among the advantages of anthracite are: (1) its large reserves, (2) its convenience to large markets, (3) its adequate production, (4) the many railroads and truck roads available for transport, (5) its greater density, helpful both in furnace and storage space; (6) its freedom from deterioration and from spontaneous combustion, so that it constitutes no fire hazard; (7) its hardness and strength and non-abrasive qualities, (8) its freedom from dust even without treatment, asserted H. J. Rose, senior industrial fellow, Mellon Institute of Industrial Research.

Other advantages are: (9) its size and preparation standards, (10) its variant burning characteristics, providing a variety of coals to suit the customer's needs; (11) greater ease in ignition than by-product and beehive coke, (12) less need for frequent attention than bituminous coal or coke because a larger quantity can be fired and the coal does not coke and expand (150 lb. of anthracite can be fired in the same space as 90 lb. of bituminous coal and, moreover, much less combustion space need be provided); (13) its non-caking qualities, (14) its smokeless combustion, (15) its freedom from tar.

Anthracite Does Not Rot Chimneys

Further advantages are: (16) the fact that its waste gaseous products do not deteriorate the chimneys that carry them, (17) its economy due to non-formation of water, (18) its suitability for banking, (19) the protective value of its ash on grates, (20) the value of its ash in controlling heat output and in promoting combustion, (21) its usual high ash-softening temperatures, (22) the reduction in its ash content resulting from improved methods of preparation, (23) the availability of its ash for manufacturing, (24) its production of clean heat, (25) its suitability for magazine heaters and for complete automatic heat.

When a quantity of natural or manufactured gas equaling in heating value a ton of anthracite is burned it produces about 300 gal. of water, for the hydrogen and oxygen combine during combustion to form steam which condenses in the chimney and with the sulphur oxides forms acids which attack mortar and



Bethlehem's low-alloy, high-strength steel opens the way to important advantages in design and use

MAYARI R fills a broad gap between low-cost structural steel and the higher-priced alloy steels.

It has the workability and weldability of structural steel at a finished-job price close to that of structural steel.

It has the strength, durability, light weight and long life of an alloy steel.

It has a combination of desirable qualities that effects important economies and worth-while improvements in a great many applications.

Mayari R—chemical composition

Carbon	0.12 max.
Manganese	0.50–1.00
Phosphorus	0.08–0.12
Sulphur	0.05 max.
Silicon	0.05–0.50
Nickel	0.25–0.75
Chromium	0.20–1.00
Copper	0.50–0.70

Mayari R—physical properties

Ultimate tensile strength	70,000 p.s.i. min.
Yield point	50,000 p.s.i. min.
Elongation, in 8 ins.	$\frac{1,500,000}{\text{T.S.}}$ per cent min.
Elongation, 2 ins.	22 per cent min.
Izod impact, average	75 ft. lbs.
Endurance limit	50,000 p.s.i.
Endurance ratio	0.70

Fully pre-proved—entirely practical

During a long and comprehensive investigation and development program Mayari R was subjected to tests that included fabrication, working, machining, welding, and other features. It was used in routine shop practice by regular workmen in building freight, passenger and mine cars; ships; barges; tanks; towers; hoppers; roofs and other structures.

From the beginning of its development, regular production open-hearth heats of Mayari R were made and used. Recommendations as to its use are based on commercial steel-making practice. Mayari R is a practical, consistent steel.

Users of steel will welcome the availability of a steel with the outstanding advantages offered by Mayari R. It broadens the scope of the designer, and provides utility to the user and economy to the owner.

New Catalog Available

The new Mayari R catalog contains detailed information about this fully pre-proved high-strength steel. We shall be glad to send you a copy and to confer with you on the profitable adaptation of Mayari R to your own requirements.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

may cause a white scum on the outside of the chimney, marring the appearance of the house, weakening plaster and discoloring both the latter and the wallpaper. Hence, corrosion-resistant material must be used to line the chimney, and drains have to be provided to connect the base of the chimney with the sewer. Fuel oil also produces water vapor, but only 200 gal. instead of 300, per heat equivalent of a ton of anthracite.

For anthracite of the same physical characteristics and the same ash-fusion temperatures, ease of pick-up will increase with increase of volatile matter, but the rate of burning will be little affected by volatile content except in so far as difference in pick-up time will lengthen or shorten the time needed to reach a steady state of burning, declared P. Nicholls, supervising fuel engineer, U. S. Bureau of Mines, for himself and B. A. Landry, associate. Large differences in ash percentage or in its fusion temperature will affect burning characteristics. The physical characteristic of anthracites which most influences rate of burning is the tendency of the pieces when heated either to retain their size or to split or break into smaller sizes. If they so break, the burning characteristics will be those of a fuel of smaller size than that fired.

Offsize Not Detrimental

Undersize and oversize within the tolerances established for anthracite sizes increase both the average rate of burning and the pressure drop through the coal bed. They also decrease the unburned combustible in the refuse, but the effects are not so large that the user will notice them. Care, however, was taken in the investigations to avoid segregation and, in a domestic-fuel bin, enough of it may occur to nullify these conclusions. Though briquets, said Ralph Sherman, Battelle Memorial Institute, may be allowed to burn down further than anthracite without extinction, they have less density, so that for a given fuel space they must be fired more frequently.

Anthracite may be burned in a warm-air furnace under almost perfect combustion conditions with very little excess air, practically no loss from carbon monoxide and with greater efficiency than bituminous coal, according to A. P. Kratz, research professor, Engineering Experiment Station, University of Illinois. Under adverse conditions, it may be burned in such a furnace with less loss of efficiency than will occur when bituminous coal is similarly burned. In a self-contained building with a warm-air furnace having an inside chimney, as much as 95 per cent of the heat developed on the grates with anthracite may be utilized in actually heating the building. The conclusions were based on experiments on a specially constructed unoccupied house and on another three-story ten-room residence of standard frame construction.

Gravity disposal of ashes from an anthracite furnace was advocated by T. I. Coe, technical secretary, structural service department, American Institute of Architects. When a bin, approached from outside the building, is provided under the furnace, the latter can be put in the kitchen with an inclosed coal bin on the opposite side of the room.

Space heaters and parlor stoves are almost exclusively confined to "small" homes costing less than $3,000, averred Allen J. Johnson, director, Anthracite Industries Laboratory. They are the sole source of heating in 17 per cent of all farmhouses, in 37 per cent of the small homes located in communities of less than 10,000 people, and in 32 per cent of the small homes of larger cities.

In the past few years, 200,000 oil-fired pot-type units have replaced a like number of anthracite stoves in the small space-heater market. A new stoker-fired space heater with forced circulation, humidification, attractive styling, compact design, convenient ash removal and minimum of attention is much needed. It should appeal to persons renting houses. Over 70 per cent of the 500,000 anthracite space heaters and practically all the oil-fired heaters are in rented homes.

Owner-occupiers in nearly all cases have a pipeless heater or a central plant of some type. Radiation loss from cook stoves supplies the sole means of heating more than 100,000 very small homes. Means for controlling radiation to the rooms could be designed. Thus cook stoves might be used throughout the year and not in the winter only. Between 30,000 and 40,000 anthracite stokers are in operation, about 1 per cent of the applications to which they would be suitable. That there are not more is because the coal stoker has only in the last two or three years received any appreciable public acceptance.

Not over 250,000 thermostats are in use, though there are 3,600,000 anthracite-fired heaters of a type suited to their installation. In cities with over 10,000 population, there are about eight thermostats per hundred suitable heating plants, but there are only 4½ thermostats per hundred in smaller towns and villages. A thermostat that can be moved readily by a renter is desirable, for there are three thermostats in owned homes to one in rented homes, probably because of the obstacles to removal from lease to lease. In small homes costing less than $3,000 there are two thermostats per 100 houses, in medium homes costing $3,000 to $7,500, four thermostats, and in larger homes costing over $7,500, thirteen thermostats. More regulation by thermostats would make the public less likely to go over to oil or gas.

Rarely used fireplaces—and there are over a million of them—offer an opportunity for anthracite sales. Half are in the cities where wood is expensive. Two hundred thousand are never used and 80,000 use the more expensive fuels. Anthracite basket fires should be started on a glowing bed of charcoal covering the entire grate area.

Between 500,000 and 1,000,000 homes in the anthracite-consuming area have no means of heating service water except in pans on the top of the cook stove. Of homes of the $3,000 to $7,500 class, 100,000 are without water provisions for year-around service.

Merchandizing of anthracite was discussed by R. W. Disque, general advertising counsellor, Syracuse Coal Exchange, and K. C. Richmond, editor, *Coal Heat*. Of eight States in the center of the country, Wisconsin used 0.98 per cent of the U. S. anthracite production; Illinois, 0.916 per cent; Michigan, 0.61; Ohio, 0.31; Minnesota, 0.29; Indiana 0.19; Iowa and Missouri, little or none, a total of 3.3 per cent.

Bituminous commercial underfeed stokers do not use a worm for the delivery of the coal, because the fuel tends to burn down into the retort during banking periods and warp or otherwise injure the exposed worm. The danger is less with anthracite, declared Ralph A. Krauss, combustion engineer, Anthracite Industries Laboratory, because the fuel is so compact that combustion rarely extends below the retort tuyeres. With anthracite the fuel bed is thinner than with bituminous coal and moves continuously toward the sides where only the ash remains which falls into the pit. An important objective is to distribute the coal evenly over the length of the grate.

Principles of Underfeed Stoker

With pusher blocks, no side of the grate is favored, but with a worm the side toward which the worm turns is favored, so a baffle must be placed on the side of the retort. Just enough air is admitted at the top of the retort to provide such an incipient clinker that the coal will be cemented without fusing the ash. The coal will then leave the hopper in a more or less solid mass and will not adhere to the grates. The retort should be regarded as an ignition zone and as a box for distributing the coal, not as a point for intense combustion.

No manual attention is needed with the underfeed stoker except to fill the hoppers twice daily and to remove the ashes twice a day, which is unskilled labor. Firedoors are closed for days or weeks at a time. Chain-grate stokers usually have been considered impracticable for capacities less than 1,000 lb. per hour, because of cost and because headroom for refractory arches is rarely available. However, a commercial chain-grate stoker marketed several years ago has been redesigned and may prove to have advantages over the commercial underfeed stoker.

Its cleanliness, labor-saving facilities and flexibility of temperature control enabled gas to drive out anthracite for hotel

Sales of Mechanical Stokers Dip Below Year Ago

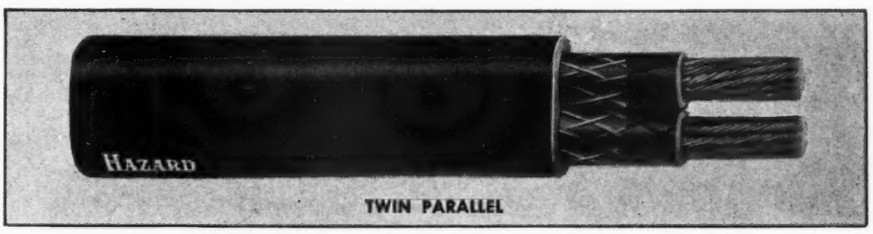
Sales of mechanical stokers in the United States during March last totaled 3,829, according to statistics furnished the U. S. Bureau of the Census by 101 manufacturers (Class 1, 54; Class 2, 32; Class 3, 28; Class 4, 25; Class 5, 11). This compares with sales of 2,561 units in the preceding month and 3,882 in March, 1938. Sales by classes in March last were: residential (under 61 lb. of coal per hour), 3,136 (bituminous, 2,823; anthracite, 313); small apartment-house and small commercial heating jobs (61 to 100 lb. per hour), 293; apartment-house and general small commercial heating jobs (101 to 300 lb. per hour), 240; large commercial and small high-pressure steam plants (301 to 1,200 lb. per hour), 122; high-pressure industrial steam plants (more than 1,200 lb. per hour), 48.

HAZACORD CABLES

FOR MINING

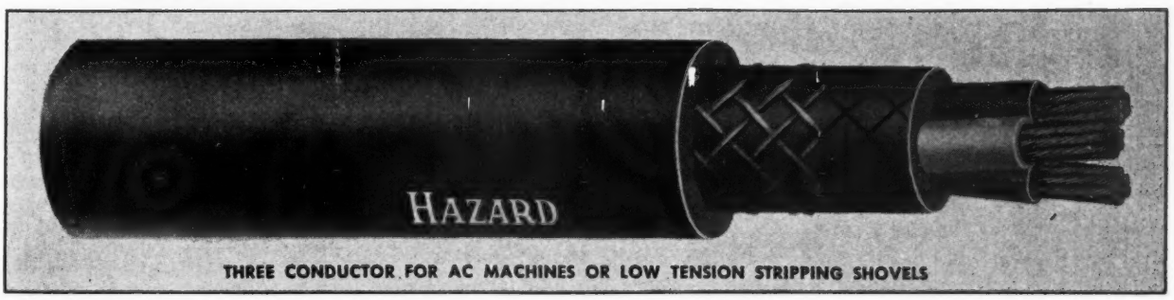
Hazacord tough mold-cured 60% rubber jackets stand abuse that would quickly destroy a less well-made cable. They will take bruising blows, pulling around sharp rock or coal edges, over switch-latches or other obstructions, through mud and water, and other rough usages. » » » Their toughness means very few repairs and therefore economy on tape expense.

SINGLE CONDUCTOR REEL CABLE



TWIN PARALLEL

TWO CONDUCTOR CONCENTRIC CABLE



THREE CONDUCTOR FOR AC MACHINES OR LOW TENSION STRIPPING SHOVELS

HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO.

WORKS: WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta Pittsburgh Buffalo Boston Detroit
Seattle Dallas Washington San Francisco St. Louis Los Angeles

and restaurant kitchens, but the Electric Furnaceman stoker introduced into an effectively insulated New York French range, declared C. A. Connell, assistant to the president, Greenwood Corporation, has overcome these difficulties. Provisions are made for service water, steam tables and deep-fat frying. Margins are so large that if the price of rice coal were raised $2 per ton, the savings still would be attractive, which is not true with regard to stoker operation for house heating, according to Mr. Connell.

Anthracite is bound to come back into favor, for no natural monopoly has ever been superseded, declared Dr. Neil Carothers, dean of College of Business Administration, Lehigh University. The industry must realize that all governmentally controlled industries are politically managed and always will be operated for their vote-getting possibilities.

Room mining with duckbills under a good roof, using undercutters, uphill shaker conveyors and duckbills and in 60 to 66 in. of coal, asserted Edgar C. Weichel, assistant general manager, Hudson Coal Co., produced with two working places 112 tons per day, which per man is 16 tons. Room mining under bad roof, with belt-elevating conveyors, shakers conveyors and duckbills, working in 85-in. coal in a seam 100 in. thick, produced per day from two places 86.4 tons with an output per man of 14.6 tons.

With room-and-pillar mining in 27-in. coal using multiple belt and chain conveyors, the output per two-shift day from sixteen rooms was 1,400 tons, output per day per producer 10 tons, and per man day for all employees in group from face to cars, 7.45 tons. With pillar mining in two beds separated by a thin rock interval using shaking conveyors, output per man day was 5.05 tons; the top bed was 30 in. thick and the bottom bed 48 in.

Pillar mining in crushed and caved ground through rock holes using shaker conveyors, seam originally 100 in. thick, now about 78 in., and rooms filled with gob and fallen rock, the output was 6.3 tons per man-day. With longwall mining, using steel props and shaker conveyors in a seam 72 to 84 in. thick with 18 in. of bone on the top, output per 24-hour day (three shifts) was 470 tons; per man-shift, 13 tons.

With the opening of the Packer mines, operation of the heavy-gravity washer at West Shenandoah will be resumed, announced W. B. Foulke, E. I. du Pont de Nemours & Co., Inc., describing the process of that company as already reported in *Coal Age*, May, 1938, p. 74. No coal below ¼-in. diameter can be cleaned by the du Pont process.

Yurkovsky Acquires Acreage

The Great Anthracite Coal Co. property in Schuylkill and Northumberland counties, Pennsylvania, totaling nearly 56,000 acres, has been purchased by M. E. Yurkovsky. Within about a month the new purchaser says he expects to open four or five mines and sell or lease some of his land. He is operating the Bear Valley colliery, trading as the Bear Valley Coal Co. The latter property, near Shamokin, was formerly operated by the Philadelphia & Reading Coal & Iron Co., from whom it was leased last fall.

Minimum Prices Under Coal Act Imminent As Commission Nears Its End

WASHINGTON, D. C., May 22—Though President Roosevelt's second Reorganization Plan foreshadowed the early demise of the National Bituminous Coal Commission, that body has stuck industriously to its duties preparatory to setting minimum prices. The Commission has announced determination of the weighted average cost of production for four Western minimum price areas, as follows: Area 6 (Colorado, Arizona, New Mexico and California), $2.73 per ton (tentative, $2.7579); Area 7 (Wyoming, Idaho and Utah), $2.16 (tentative, $2.2347); Area 9 (Montana), $1.48 (tentative, $1.5899); Area 10 (Washington, Oregon and Alaska), $3.22 (tentative, $3.2656).

Minimum prices for coal produced in those areas have been proposed by the Commission. The prices will not become effective, however, until the completion of final hearings, scheduled to begin May 19 at Denver, Colo. If evidence adduced at the hearings shows the necessity for adjustments, the prices will be subject to revision. In conformance with the Coal Act, the prices must be set at levels that will yield for each district a realization per ton which approximates, as nearly as possible, the weighted average cost of production for the price area in which the district is located.

The Commission announced today: "In order that there may be no misunderstanding on the part of the bituminous-coal industry and consumers of bituminous coal, the National Bituminous Coal Commission states that it intends to make its findings and determinations relating to the weighted average of the total costs of tonnage for Minimum Price Areas 1 to 5 inclusive (comprising Eastern and Midwestern producing districts), to establish marketing rules and regulations for all districts, and to publish coordinated minimum prices for all districts, as proposals, to be considered at a hearing to be announced at a later date, all in accordance with the functions conferred upon the Commission by the Bituminous Coal Act of 1937."

Secretary Ickes also released a statement that when the functions of the Commission are transferred in accordance with the President's Executive Order and Reorganization Plan II, he will proceed expeditiously to the establishment of coordinated minimum prices in compliance with constitutional requirements and the coal act.

Consuming market areas for the entire country have been proposed by the Commission reaching a total of 180. In the list established prior to the revocation of prices in 1938 there were only 157 areas. The Commission explains the increase as being brought about to fit the new prices.

A brief was filed with the Commission on May 3 by John Carson, Consumers' Counsel, setting forth objections to tentative findings as to the reasonable cost of selling coal in Minimum Price Areas 1, 2 and 3. The objections are based on the opinion of Consumers' Counsel that the evidence on selling cost submitted does not substantiate the tentative findings and that these findings are contrary to the express terms of the act.

In an order dated May 1 the Commission granted provisional approval to Arkansas-Oklahoma Smokeless Coals, Inc., as a marketing agency. Applications for approval as agencies have been filed also by producers of coals from the Cary and Kennedy seams in the Upper Buchanan district of Virginia and by the Southwest Coal Corporation, of Kansas City, Mo. Officers of the Upper Buchanan group are: president, R. D. Stockdale, president, Red Jacket Coal Sales Co.; vice-president and treasurer, C. A. Hamill, president, Sycamore Coal Co.; secretary, J. J. Ardigo, secretary, Coal Operators' Association of the Williamson Field. Southwest Coal Corporation officials are: president, E. M. Douthat, president, Tebo Coal Co.; vice-presidents, K. A. Spencer, vice-president, Pittsburg & Midway Coal Mining Co., and W. C. Shank, president, Crowe Coal Co.

Funds Restored for Coal Control

The Senate has amended the Second Deficiency Bill to delete from the Commission's current appropriation act language which restricts the available funds to the amount collected under the 1c. excise tax in the Coal Act. The amendment, sponsored by Senator Neely (D., W. Va.), was passed without a dissenting vote under a suspension of the Senate rules. The measure was sent to the conference committee, reported back, and the report, plus Senator Neely's amendment, passed the House. The Senate also restored $600,000 which had been cut from the Commission's appropriation by the House, and removed restrictive language similar to that deleted from the current appropriation. The 1940 budget has been reported out of joint conference committee with these changes and is now pending on the calendar. The 1940 appropriation, subject to acceptance of conference report by the Senate and House, is $3,500,000.

"The Committee for Amendment of the Coal Act is in sympathy with the President in his second reorganization order, which abolishes the National Bituminous Coal Commission," declared John A. Howe, chairman of the committee, in a statement issued May 11. "By this action the President indicates that he, like a great portion of the bituminous-coal industry,

Permissible Plates Issued

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in April, as follows:

American Mine Door Co.: Type "MM Dustributor" (rock-dusting machine); 2-hp. motor, 230 volts, d.c.; Approval 369; April 15.

Joy Mfg. Co.: Type 42D2 "Shuttle Car" (storage-battery operated); three 2-hp. motors, 90 volts, d.c.; Approval 370; April 21.

Portable Lamp & Equipment Co.: "Portable electric cap lamp; Approval 27; April 21.

NO SIR! YOU WON'T SEE ANY BUG DUST HERE!

TRY taking mine photographs if you want to see how thick the dust really is. Here's one where the photographer went in while the men were working . . . set up his equipment . . . shot the pictures without any difficulty. The air was clean as a whistle!

With "Ventube"* ventilating duct, attached to a blower of required capacity, you can keep the air in your mines free from coal dust. Even in low coal "Ventube" keeps clean, fresh air circulating throughout the rooms. Work speeds up! Production increases! And you save money!

In fact, with "Ventube" you can drive 300 feet without a cross-cut—and the money you save by eliminating expensive break-throughs will more than pay for the entire ventilating system.

Install a few sections of "Ventube" where you're having the most trouble with dust. See "Ventube" in action. We'll wager the results will be so satisfactory that you'll never be satisfied with any other ventilating systems.

*VENTUBE *is du Pont's registered trade-mark for its flexible rubberized mine ventilating duct.*

DU PONT also makes a heavy-duty powder bag of extra-heavy, long-fibered Hessian cloth—coated and impregnated with rubber that won't peel off. Available in several roomy sizes. Glad to send prices and complete information on request.

DU PONT VENTUBE REG. U.S. PAT. OFF.

E. I. DU PONT DE NEMOURS & CO., INC.

"Fabrikoid" Division **Fairfield, Connecticut**

THE FLEXIBLE VENTILATING DUCT

is dissatisfied with the Guffey coal act and the manner in which it has worked out. By transferring the functions of the Coal Commission to the Secretary of the Interior he is doing everything he can under the authority given him by Congress to correct conditions that have brought near ruin to the soft-coal industry, resulting in unemployment, chaos and losses of nearly $100,000,000 to the industry in the two years the act has been in effect. Congress should now take up where the President was forced to leave off and amend the Coal Act itself by striking from it the costly unworkable price-fixing provisions, as well as the tax, as provided in the Allen bill (H. R. 5119) now pending before the House Ways and Means Committee. This should be done now in order that stabilization of this important basic industry can be accomplished without further delay."

A revised version of the Allen bill (H. R. 6325), amended to conform to changed conditions brought about by passage of the Reorganization Act, was introduced in the House on May 15.

Representative Allen introduced in the House on May 16 a joint resolution proposing that the 1c. per ton tax imposed on bituminous coal under the Coal Act be canceled. The measure was referred to the Committee on Ways and Means.

The U. S. Supreme Court agreed on May 2 to hear argument in the appeal of the city of Atlanta, Ga., from a decision on Feb. 16 by three judges in the District of Columbia Federal District Court upholding the constitutionality of the Coal Act (*Coal Age*, March, p. 64). The city sought an injunction to restrain the Commission from promulgating or seeking to enforce minimum price orders, or from taking any steps whatsoever which might affect the city, on the ground that the act was clearly in violation of the Federal Constitution. The court found, however, that since all coal purchased by Atlanta is mined in other States, the coal clearly came under commerce clause jurisdiction. It also found that the regulations prescribed by Congress in the challenged act were valid uses of the commerce regulatory power, and dismissed the city's suit.

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Personal Notes

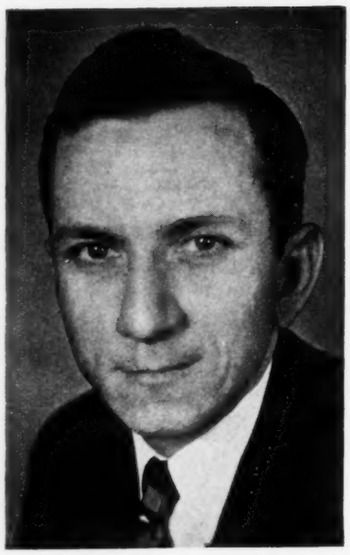
C. W. ARNOLD has been appointed superintendent by the Raymond City Coal & Transportation Co., Raymond City, W. Va.

C. L. BAILEY has been made mine foreman at the Wacomah mine of the Wacomah Coal Co., Amigo, W. Va.

ANGUS R. BROWN, superintendent of ventilation, Tennessee Coal, Iron & Railroad Co., has been appointed chief coal-mine inspector by the company, vice Ed. Flynn, retired. During Mr. Brown's long association with the company he has worked as miner, mine foreman, assistant superintendent of the Pratt division, and superintendent of the Bayview division. He also was connected for a time with the U. S. Bureau of Mines.

ROY CANIC has been named foreman at Affinity mine of the Pemberton Coal & Coke Co., Affinity, W. Va.

P. CARROLL has been appointed superintendent at the Hitchman mine of the Hitchman Coal & Coke Co., Benwood, W. Va.



George R. Kinzie

O. B. CLARK has been named superintendent at Stanaford Nos. 1 and 6 mines of the Koppers Coal Co., Stanaford, W. Va.

G. S. DOOLEY has been made superintendent at Loup Creek Nos. 1 and 2 mines of the Loup Creek Colliery Co., Page, W. Va.

WILLIAM L. DOOLITTLE, mechanical superintendent in charge of construction, mechanical and electrical engineering departments, Consolidation Coal Co., has been named chief engineer with headquarters at Fairmont, W. Va.

R. R. ESTILL has been appointed superintendent at Nos. 4 and 5 mines of the United States Coal & Coke Co., Thorpe, W. Va.

J. S. FARINASH, personnel manager, West Virginia division, Consolidation Coal Co., has been made compensation administrator, Kentucky division, with headquarters at Jenkins.

BROOKS FLEMING, JR., director of employee service department, Consolidation Coal Co., has been also placed in charge of workmen's compensation in the company's four divisions.

ED FLYNN, chief coal-mine inspector of the Tennessee Coal, Iron & Railroad Co. for the last 29 years, retired on May 1. Early in his career he worked in mines in Texas and Indian Territory, became president of District 20, U.M.W., then associate State mine inspector and, finally, chief State mine inspector. He resigned the last named post to begin his long association with T.C.I. & R.R.

WILLIAM FORD has been named foreman at the Carswell mine of the Koppers Coal Co., Kimball, W. Va.

H. J. GENTRY, former mine inspector, has been appointed supervisor of mine inspectors in the State Department of Industrial Relations of Alabama, a newly created position. OTIS H. YOUNGBLOOD and MONROE S. BAILEY have been named as mine inspectors.

F. K. GIBSON has been made foreman at the Emily mine of the Monongahela Rail & River Coal Corporation, Morgantown, W. Va.

EDGAR H. GRAFF, safety director for the last several years for the New River Co., Mount Hope, W. Va., has been promoted to assistant manager of mines. He will continue to direct the safety department in addition to his new duties.

R. S. GRAHAM, president, Kemmerer Gem Coal Co., and vice-president, Wise Coal & Coke Co., was elected president of the Virginia Coal Operators' Association at its annual meeting on May 17. Other officers named are: vice-president, J. D. ROGERS, vice-president, Stonega Coke & Coal Co.; secretary-treasurer, GEORGE H. ESSER (reelected); assistant secretary-treasurer, E. H. ROBINSON (reelected).

J. H. HANSON, acting personnel manager, Maryland and Pennsylvania divisions, Consolidation Coal Co., has been named to the position of compensation administrator in those divisions.

W. J. HEATHERMAN has been appointed superintendent at Cedar Grove No. 1 mine of the Kelleys Creek Colliery Co., Ward, W. Va.

OKEY JOHNSON has been named foreman at the Cedar Grove mine of the Cedar Grove Collieries, Inc., Cedar Grove, W. Va.

FRANK KEESEE has been made foreman at the Vera Poca No. 3 mine of the Vera Pocahontas Coal Co., Landgraff, W. Va.

GEORGE R. KINZIE, economist and business analyst, has been added to the staff of Battelle Memorial Institute, Columbus, Ohio, to aid in the consideration of economic factors related to industrial research. Problems in industrial economics as related to technical research and development will be referred to him for analysis. Formerly associated with Standish, Racey & McKay, investment counsel, of Boston, Mass., he is a graduate of the University of Florida and received a master's degree from Harvard Business School in 1935.

G. E. LAWLESS has been appointed foreman at Peerless Nos. 1 and 2 mines of the Peerless Coal & Coke Co., Vivian, W. Va.

JOHN LAWTON has been named foreman at Vera Nos. 1, 2 and 3 mines of the Vera Pocahontas Coal Co., Iaeger, W. Va.

E. F. LIMERICK, chief clerk, operating department, Consolidation Coal Co., has been made compensation administrator, West Virginia division.

GEORGE MCARDLE has been made foreman at the Red Ash mine of the Red Ash Smokeless Coal Co., Iaeger, W. Va.

GEORGE MCKINNEY has been appointed foreman at Stotesbury No. 8 mine of the Koppers Coal Co., Stotesbury, W. Va.

W. J. OPENSHAW has been named superintendent at Peerless Nos. 1 and 2 mines of the Peerless Coal & Coke Co., Vivian, W. Va.

WILLIAM E. PARSONS has been made

Van B. Stith

superintendent at Blackberry and B mines of the Riverview Coal Mining Co., Coalburg, W. Va.

C. E. PAULEY has been named superintendent at the Cinderella mine of the Sycamore Coal Co., Cinderella, W. Va.

ROBERT PHILLIPS has been made foreman at Leckie Nos. 1 and 2 mines of the Leckie Smokeless Coal Co., Anjean, W. Va.

FRED P. REINHARD has been appointed superintendent at the Red Ash mine of the Red Ash Smokeless Coal Co., Iaeger, W. Va.

E. E. RITTER has been named general manager by the Red Jacket Coal Corporation, Red Jacket, W. Va.

GILBERT SMITH, general manager, Fire Creek Coal & Coke Co., Fayetteville, W. Va., has resigned as president of the New River Coal Operators' Association. His withdrawal followed his refusal to sign the association contract with the United Mine Workers.

VAN B. STITH, superintendent of mines, Anchor Coal Co., has been elected president of the Coal River Mining Institute. Other officers named are: first vice-president, W. M. DAVIS, superintendent, Nellis mine, American Rolling Mill Co.; second vice-president, H. B. MORGAN, general superintendent, Red Parrot Coal Co.; third vice-president, E. C. BERKELEY, superintendent, Van mine, Youghiogheny & Ohio Coal Co.; secretary, T. B. FEAGANS, Anchor Coal Co.; treasurer, E. E. WHITE.

FREDERICK THOMPSON has been made maintenance foreman by the New River Co., Mount Hope, W. Va., vice T. B. Mills, deceased. Mr. Thompson had been first assistant to Mr. Mills for the last seven years.

CHESTER TUGGLE has been made foreman at Leckie No. 4 mine of the Leckie Smokeless Coal Co., Anjean, W. Va.

C. C. VIRGIN has been appointed superintendent at the Golden Ridge No. 6 mine of the Minds Coal Mining Corporation, Monterville, W. Va.

C. E. WALKER has been named superin-

Kay-Hart

William J. Wolf

tendent at the Brooklyn mine of the Scotia Coal & Coke Co., Brooklyn, W. Va.

WILLIAM J. WOLF, division manager, West Virginia division, Consolidation Coal Co., has been appointed general manager of operations of the company, vice Charles Dorrance, resigned. Mr. Wolf has been associated with the company for nearly 25 years, beginning as superintendent of two of the company's mines and later being made manager of the Maryland division.

Set for Illinois Boat Meeting

Safety, hoisting, employee relations and preparation will receive consideration at the summer meeting of the Illinois Mining Institute. Sessions will be held aboard the Steamer "Golden Eagle," which will leave St. Louis, Mo., at 10:30 p.m., June 9, and return at 7 a.m., June 11. Following an address of welcome by Paul Weir, president of the institute, the following papers will be presented: "Accidents From Roof and Face Falls, and Methods for Their Prevention," Benn Pitts, Illinois State mine inspector; "Caging and Hoisting, and Increased Maintenance Due to Speed," Dale Carter, superintendent, No. 2 mine, Bell & Zoller Coal & Mining Co.; "What Qualities the Mine Employee Would Like in a Mine Foreman," Dr. J. J. Rutledge, chief mine engineer, Maryland Bureau of Mines; "Coal Preparation Plant, Peabody Coal Co. Mine No. 24," Jack R. Verhoeff, construction engineer, Peabody Coal Co.

To Name Research Associates

Four research associates are to be appointed at Battelle Memorial Institute, Columbus, Ohio. University and college graduates who have shown an aptitude for research, either in graduate or industrial work, are eligible. Preference will be given to those who have specialized in physics, chemistry, metallurgy, fuels or ceramics. Each appointment is for one year, including vacation, and may be ex-

tended for a second year; the salary is $1,800. Appointees work full time on approved research projects under supervision of the Battelle technical staff.

The projects assigned are fundamental or general, leading to the publication of information that will be useful to science and industry. The institute conducts research in both fundamental and applied science, developing trained research men for industry. Application forms and further information may be obtained from Clyde E. Williams, director.

WPA Air-Pollution Survey Launched in Chicago

A comprehensive air-pollution survey of Chicago and vicinity has been launched by the Works Progress Administration. Under the sponsorship of the Armour Institute of Technology, Lewis Institute, and the city government, $392,000 has been appropriated for the study, which will operate until next December. A number of the city's leading civic organizations have indorsed the project, among them the Western Society of Engineers, American Society of Mechanical Engineers, Woman's City Club, General Managers' Association, Chicago Association of Commerce, and the Hays Institute of Combustion Engineering.

Essentially a fact-finding investigation, the study aims to obtain definite established data on the nature, composition and effects of contaminants in the air. The phases to be studied are: (1) visible smoke, (2) dust and noxious gases in the air, (3) origin of dust and noxious gases, (4) ultra-violet and visible light penetration through the atmosphere, (5) abstracting scientific literature dealing with air pollution, (6) collection and codification of legal opinions and decisions affecting air pollution.

Obituary

DAVID THOMAS PRITCHARD, 45, general superintendent and purchasing agent for the Algoma Block Coal Co., Lothair, Ky., died May 21 of complications following an operation for a ruptured appendix. He had been ill for four weeks. His father, the late W. J. Pritchard, had been general manager of the Thomas Coal Co. and Crystal Block Coal & Coke Co., of West Virginia.

WALTER BAUM, 49, master mechanic, Perry Coal Co., O'Fallon, Ill., died April 29 apparently of a heart attack while driving his automobile on his way home from work. He had been chief mechanic for the company for twenty years and was a frequent contributor to the Operating Ideas section of *Coal Age*.

HERMAN M. GRIGGS, 78, well known in the coal industry as head of the Ore & Coal Exchange, Cleveland, Ohio, for nineteen years, died April 8 in Oakland, Calif. He retired about two years ago because of ill health.

THOMAS S. LEWIS, 73, former president of the United Mine Workers, which he helped found, died May 1 at Charleston, W. Va. He started as an anthracite

breaker boy, becoming secretary-treasurer of the Ohio U.M.W. in 1897, international vice-president in 1900, and president in 1908, serving three years. Later he published the *Coal Mining Review* and assisted in organizing the National Coal Association, retiring from business in 1930 because of failing health. He was not related to the present head of the U.M.W.

CARL C. HETZEL, 67, president of the Georges Creek Coal Co., with operations in Lonaconing, Md., died April 10 at his home in Cumberland, Md. He had been in poor health for some time, the end being brought on by a complication of ailments.

W. S. AYERS, 88, consulting mining engineer, of Hazleton, Pa., died May 5. He had given much attention to the removal of boiler ash from mine dumps, using its disposition to roll on an incline to separate it from coal and heavy impurities.

Rayon Derived From Coal Granted Patents

Four patents for hosiery and other knitted fabrics made of a new type rayon called Nylon, a synthetic yarn derived from coal, water and air, were granted on May 9 to E. I. duPont de Nemours & Co., Inc., Wilmington, Del., according to an announcement by the company (see *Coal Age*, December, 1938, p. 140). The patents cover, the company asserted, the use of polyamide yarn for stockings, pre-boarding of stockings, setting yarns and fabrics, and the use of sodium sulphite for setting.

The company hailed the patents as marking "a phenomenal advance in the textile arts, assuring a truly successful stocking from a synthetic yarn."

'Koppers College' Graduates

More than 150 officials and employees of fuel dealers in Philadelphia, Pa., representing nearly 50 per cent of the trade in the city, attended a graduation banquet on April 26 marking the end of a sales training course given to Koppers Coke dealers. It was a "concentrated" course lasting ten weeks, in charge of the Philadelphia Coke Co. Five classes with an average attendance of 40 were held each week at the Central Y.M.C.A. Both written and oral lessons were prepared and instruction was given by lecturers who used slide films as well as chalk and blackboard. A second course for those who could not be accommodated will be held next autumn.

Trade Literature

AIR RECEIVERS — Ingersoll-Rand Co., Phillipsburg, N. J. Folder Form 9202 describes complete line of 23 units available for maximum pressures of 125, 250, 350 and 500 lb. Specification chart is included.

AUTOMATIC MINE-CAR COUPLER—Ohio Brass Co., Mansfield, Ohio. Booklet No.

676AM, entitled "Now You Can Install O-B Automatic Couplers at a Price You Can Easily Afford," contains descriptive matter, installation views and blueprint diagrams of the new coupler.

CABLE INSULATION—Okonite Co., Passaic, N. J. Bulletin OK-2007A gives data on the application and advantages of Okolite insulated cables for high-voltage circuits, comparative curves of operating efficiency, load-carrying ability and moisture resistance; also on installation methods, tests and available designs.

CAR PULLER—Jeffrey Mfg. Co., Columbus, Ohio. Folder 712 gives data, with specifications, on the Type 240-A all-purpose unit.

CENTRIFUGAL DRYERS—Koppers-Rheolaveur Co., Pittsburgh, Pa. Folder describes the use of Carpenter units in industries where granular materials are to be dried. Individual features are emphasized.

COAL CUTTERS—Jeffrey Mfg. Co., Columbus, Ohio. Catalog 705 is devoted to the "29" series of track-type units, including the 29-U, a universal type cutter with hydraulic control which cuts and shears any place in the seam; 29-LE, a machine with mechanically operated controls that bottom cuts, top cuts and shears; and 29-L, a machine with optional arrangement of cutter bar for either top, bottom or center cutting. Catalog 707 covers the "35" series of short-wall cutters available in six types.

COMPRESSORS—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin 850-B52 is devoted to gasoline-engine-driven portable units. Bulletin H-850-B56 describes Aero two-stage full-diesel-drive portable units. Bulletin L-611-B8 treats of Types HB and HS motor-driven and steam-driven single-cylinder single-stage feather-valve compressors. The three bulletins are illustrated and give specifications.

COUPLING—Falk Corporation, Milwaukee, Wis. Bulletin 4630 details the functions, design and principles of operation of the Falk controlled-torque Steelflex coupling for protection of mechanical drive systems against damage by shock overloads.

DEEPWELL PUMPS—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin W-321-M3A cites advantages of Jetflo units, telling how they operate and giving installation instructions.

DIESEL-DRIVEN GENERATORS — Caterpillar Tractor Co., Peoria, Ill. Bulletin Form 4658 shows the wide range of applications of "packaged power," either as standby or as the main power plant. Many actual installations are pictured.

DIESEL ENGINES—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin S-500-B5E details outstanding features of Type B vertical four-cycle direct-injection units, giving specifications. Bulletin S-500-B63 tells of the outstanding features of Type CC vertical four-cycle units, giving specifications and illustrations.

DUST CONTROL—W. W. Sly Mfg. Co., Cleveland, Ohio. Treatise discusses the

hazards of dust and how to control it efficiently and economically.

EARTH MOVING—R. G. LeTourneau, Inc., Peoria, Ill. A new bi-monthly publication, LeTourneau Methods, has been introduced to explain the most efficient and modern means of handling varied jobs in the fields of mining, construction and kindred industries.

ELECTRICAL CONTROLS — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Descriptive Data 31-132 tells about the advantages of its small-capacity switchboard panels for the control of generators and feeder used for general power and lighting service in small direct-current plants. Descriptive Data 33-745 describes oil circuit breakers for framework or pole mounting, manually or electrically operated. Descriptive Data 33-123 cites features of a solenoid operating mechanism for fast reclosing of high-voltage circuit breakers used in conjunction with carrier-current or high-speed relays.

EYE PROTECTION—Lincoln Electric Co., Cleveland, Ohio. Specification Bulletin No. 359 cites the dangers to the eye involved in many operations in this age of steel and stressing the advantages of Lincoln lenses in guarding against them.

EYE PROTECTION—Mine Safety Appliances Co., Pittsburgh, Pa. Bulletin No. CE-8 features the qualities of the various types of M.S.A. protective lenses and describes a complete line of goggles and spectacles, welding helmets and shields, combination protective hats with welding shields or goggles, and several additional new items.

FEEDERS, CONVEYORS AND SCREENS—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin No. 1833-A describes and illustrates the complete line of Utah electromagnetic feeders and screens, which operate without rotating or sliding parts. Units are shown having a wide variety of construction and application.

FLEXIBLE METAL TUBING — American Brass Co. (American Metal Hose Branch), Waterbury, Conn. Catalog (24 pp.) contains discussion on the proper use of seamless flexible metal tubing for conveying steam, liquids, gases; controlling vibration; and connecting misaligned and moving parts. There also are complete engineering data and specifications, with simple installation rules.

FRICTION PRODUCTS—Gatke Corporation, Chicago. Bulletin Form No. Ind. 4 features brake blocks, frictions, brake linings, clutch disks and bearings for practically every type of industrial service.

HEAD AND EYE PROTECTION—Chicago Eye Shield Co., Chicago. Catalog (24th ed.) lists a wide line of goggles, respirators, spectacles, masks, welding helmets and other safety devices; recommendations are given on the type of respirator for use in more than 325 harmful gases, fumes, mists and dusts.

MAGNETIC CONTROL—Electric Controller & Mfg. Co., Cleveland, Ohio. Folder treats of EC&M frequency-relay control unit for a.c. wound-rotor motors said to be of importance to coal mines, railroads and many other industries.

PLASTIC COATINGS—Amercoat Sales Agency, Huntington Park, Calif. Booklet

contains description, some ideas of the present uses, and application procedure for various and sundry types of Amercoat cold-applied corrosive-resistant plastic coatings.

PREPARATION EQUIPMENT—Jeffrey Mfg. Co., Columbus, Ohio. Catalog 701 cites features and advantages of the company's diaphragm jigs and unit washeries. Bulletin 706 has to do with slow-speed flextooth crushers for smaller sized domestic stoker coal. Bulletin 709 describes the principles of design of Jeffrey-Traylor all-electric vibrating units, with pictures of typical installations.

PROTECTIVE COATINGS—Continental Asbestos & Refining Corporation, New York City. Catalog describes a variety of coatings for floors, walls and other surfaces of various types under conditions of all kinds.

SHARPENER AND FURNACE—Ingersoll-Rand Co., Phillipsburg, N. J. Bulletin Form 2176-A gives details of the company's line of air-operated rock-drill-steel sharpeners, the Jackrod threading device, and two sizes of oil furnaces. The equipment is designed for use in mines, quarries, heavy construction work, and other industries employing rock-drilling machinery.

SPECIFYING CONVEYOR BELTS—Pioneer Rubber Mills, San Francisco, Calif. Folder treats of conveyor, elevator and transmission belting for any given operating condition.

SPEED REDUCERS — Stephens - Adamson Manufacturing Co., Aurora, Ill. Catalog 7838 gives complete engineering information on Saco units for use on conveying, elevating, screening and transmission equipment.

SMALL A. C. WELDERS — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Descriptive Data 26-320 describes the Midget Marvel Flexarc unit, comprising a special transformer and control for a.c. arc welding and meeting the need for an economical welder for all-round maintenance and shop work as well as light construction work.

VARI-PITCH SHEAVES — Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin No. 1261-B depicts in word and picture the stationary control type for occasional changes of speed and the motion control type for use where frequent speed changes are necessary. Dimension sheets and a variety of installation pictures are included.

VALVES—Crane Co., Chicago. Folder entitled "Service Characteristics of Globe Valves and Gate Valves—How to Pick the Right One Every Time" is designed to help the user select the proper valve for his particular service. Two charts are included to assist in this purpose.

VIBRATING SCREEN—Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Leaflet 2361, entitled "Profits From Slack," illustrates and describes the operation of the Sta-Kleen vibrating unit for screening wet coal and also applicable in other process industries.

WEDGE-WIRE SCREENS — Koppers-Rheolaveur Co., Pittsburgh, Pa. Leaflet de-

scribes units made of a variety of metals and in a number of surface patterns to meet specific requirements.

WELDED DIPPERS — Pettibone Mulliken Corporation, Chicago. Folder stresses advantages of the Pioneer welded dipper designed for hard digging. Pictures of the unit in use in stripping operations are shown.

WOOD PRESERVATION — Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin No. 1834 touches on the history of wood preservation, kinds of preservatives used in modern treatment of woods, methods and processes used to preserve them, economies of the practice, types of machinery used, and gives numerous designs of complete plants.

Fatality Rate From Accidents At Mines Again Wanes

Accidents at coal mines in the United States caused the deaths of 67 bituminous and 12 anthracite miners in March last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 35,290,000 tons, the death rate among bituminous miners was 1.90 per million tons, compared with 2.39 in the corresponding month of last year.

The anthracite fatality rate in March last was 3.35, based on an output of 3,579,000 tons, as against 4.48 in March, 1938.

For the two industries combined, the death rate in March last was 2.03, compared with 2.67 in the third month a year ago.

Fatalities during March last, by causes and States, as well as comparable rates for the first three months of 1938 and 1939, are shown below:

Industrial Notes

LINK-BELT CO. (shovel division) has absorbed the Speeder Machinery Corporation, Cedar Rapids, Iowa, manufacturer of excavating and materials handling shovels-draglines-cranes. For the present each organization will continue to operate independently.

WESTINGHOUSE ELECTRIC & MFG. CO. has elected Martin W. Smith, manager of engineering, as a vice-president; he will direct all the company's engineering activities. R. B. Mildon, vice-president, formerly in charge of the East Pittsburgh division, has moved to the Pittsburgh headquarters to assume special sales assignments. A. C. Streamer has been appointed general manager of the East Pittsburgh division. W. F. White has been made manager of the lighting division, at Cleveland, Ohio, succeeding F. R. Kohnstamm, who has been appointed sales manager of the merchandising division, Mansfield, Ohio.

L. H. GILMER CO., Tacony, Philadelphia, Pa., has promoted Matthew R. Oberholzer to sales manager. He has been with the company for ten years, the last six as assistant sales manager. A. K. Schwindewolf has been transferred from the Philadelphia sales staff to become district manager for Louisiana, Mississippi and Arkansas, with headquarters in New Orleans, La. O. K. McCullough has been made district manager for Kansas and western Missouri, with Kansas City headquarters. Cliff T. Pilkey has been named district manager for eastern Missouri, operating from St. Louis.

QUAKER CITY RUBBER CO. has moved its Chicago office to 2035 South Michigan Ave., where it is carrying an enlarged

UNITED STATES COAL-MINE FATALITIES IN MARCH, 1939, BY CAUSES AND STATES

State	Underground								Open-cut and Surface				Grand total
	Falls of roof	Falls of face	Haulage	Explosives	Electricity	Machinery	Other causes	Total underground	Shaft	Mine cars	Railway cars	Total surface	
Alabama	1	...	...	...	...	...	...	1	....	....	....	....	1
Arkansas	...	...	...	2	...	...	...	2	....	....	....	....	2
Colorado	1	...	...	...	1	...	...	2	....	....	....	....	2
Illinois	3	2	2	...	...	...	...	7	1	....	....	....	8
Indiana	...	...	1	...	...	...	...	1	....	....	....	....	1
Kentucky	8	...	...	...	1	...	...	9	....	1	....	1	10
Ohio	2	...	...	...	...	1	...	3	....	....	....	....	3
Pennsylvania (bit)	7	2	5	...	...	...	1	15	....	....	....	....	15
Virginia	2	1	...	...	...	...	...	3	....	....	....	....	3
West Virginia	18	...	3	1	...	...	...	22	....	....	....	....	22
Total (bituminous)	42	5	11	3	2	1	1	65	1	1	.....	1	67
Pennsylvania (anthracite)	6	3	1	...	...	...	1	11	....	....	1	1	12
Grand Total	48	8	12	3	2	1	2	76	1	1	1	2	79

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January–March, 1938 and 1939

Cause	Bituminous				Anthracite				Total			
	Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons	
	1938	1939	1938	1939	1938	1939	1938	1939	1938	1939	1938	1939
Falls of roof and coal	125	117	1.468	1.117	45	34	3.638	2.689	170	151	1.743	1.286
Haulage	40	34	.470	.325	10	3	.808	.237	50	37	.513	.315
Gas or dust explosions:												
Local	5	2	.059	.019	1	...	.081	.....	6	2	.061	.017
Major	15	...	.176	.....	...	...	.....	.....	15	...	.154	.....
Explosives	4	3	.047	.029	3	8	.243	.633	7	11	.072	.094
Electricity	10	13	.117	.124	....	1	.....	.079	10	14	.103	.119
Machinery	7	6	.082	.057	....	...	.....	.....	7	6	.072	.051
Shaft	2	1	.024	.010	....	2	.....	.158	2	3	.020	.026
Miscellaneous	4	2	.047	.019	3	4	.243	.316	7	6	.072	.051
Stripping or open-cut	1	1	.012	.010	8	1	.647	.079	9	2	.092	.017
Surface	10	7	.117	.067	1	4	.081	.316	11	11	.113	.094
Total	223	186	2.619	1.777	71	57	5.741	4.507	294	243	3.015	2.070

* All figures subject to revision.

stock of mechanical rubber goods for the mining industry. George C. Johnson is branch manager.

ROBINS CONVEYING BELT CO. has transferred R. W. Eichenberger, vice-president, formerly acting as manager of the Chicago office, to the New York office, where he will collaborate in general sales management with H. Von Thaden, vice-president.

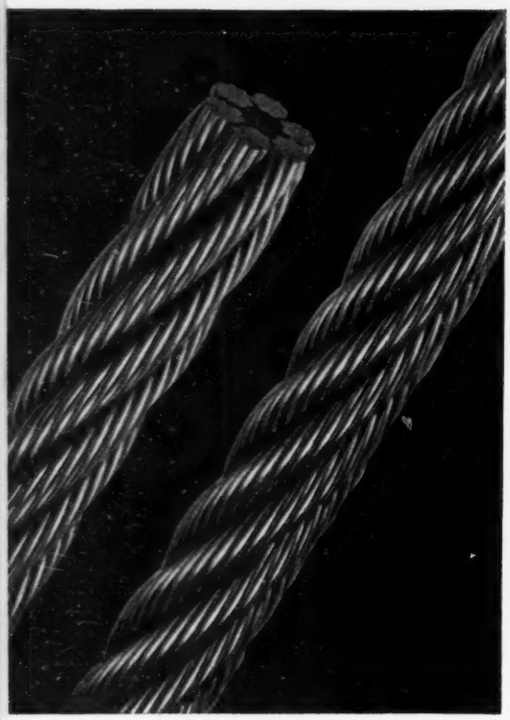
ALLIS-CHALMERS MFG. CO. has appointed Walter Geist vice-president. He entered the employ of the company in 1909 as an errand boy. Stanley Michaelson, engineer in the mining division, has been transferred to the Salt Lake City (Utah) district office, where he will assume new duties as sales engineer specializing in mining and related machinery built by the company.

UNITED STATES RUBBER CO. has appointed Willard H. Cobb as general manager of its mechanical goods and general products divisions. For several years he has been general factory manager, mechanical good plants.

CHARLES M. KIRKLAND has been elected secretary of the OKONITE CO., Passaic, N. J., and the OKONITE-CALLENDER CABLE CO., Paterson, N. J. He has been with the Okonite organization since his graduation from Harvard.

STEWART-WARNER CORPORATION, Chicago, has advanced Fred R. Cross, director of advertising, to the position of sales manager of the Alemite retail sales division. He has been connected with the corporation for the last fifteen years.

6 items that will help y



Bethanized Wire Rope wherever corrosion is a factor

BETHANIZED wire rope represents a distinct advance over all other types of zinc-coated rope. The exclusive electrolytic process builds up a perfectly uniform zinc coating on each individual wire. The zinc is 99.9+ per cent pure and extremely ductile. Because it is applied cold, physical properties of the steel are not adversely affected.

Bethanized rope is superior to galvanized rope in resistance to rust and in resistance to fatigue. It is equal to or better than bright-wire rope both in endurance and fatigue strength.

Bethanized rope is available in all constructions and is priced the same as galvanized. It should be used wherever galvanized rope has previously been used, particularly as guys. In addition, with its bright-wire toughness, it is finding applications where galvanized ropes would not serve but where resistance to corrosion is important.

True hot-forged Track Spikes

BECAUSE the hot-forging process is standard practice in manufacturing railroad spikes, Bethlehem makes it standard practice with mine spikes as well.

Hot-forging has three definite advantages. It produces better flow lines with fibers virtually continuous from the point to the top of the head. It anneals the spike; heads won't fly off because there are no internal stresses which weaken the material. It gives the spike a coat of tightly adhering mill scale which protects it from rust and gives it greater gripping power in the tie.

There is real engineering design behind Bethlehem Hot-Forged Mine Spikes. Lips are ample to give the spike a good hold on the rail. The point is sharp and narrow so that it does the least possible damage to the tie. And the head is broad. It stays on, even when spikes are re-used.

Car Sides and repair material

IT'S A time-saving advantage to order all car-repair material from one source. Bethlehem, as a steel producer and car builder, is equipped to act as a central source of supply for all materials.

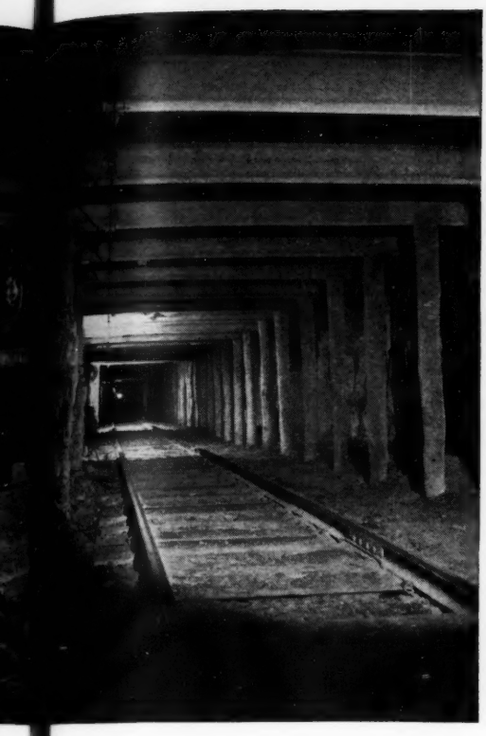
Bethlehem rolls any size of plate or sheet of plain, copper-bearing or Mayari R (high-strength corrosion-resisting) steel. All types of angles and structural members are also available in these steels. In addition, Bethlehem makes forged-steel mine-car wheels, axles, castings and forgings and can supply rivets and bolts of any standard size.

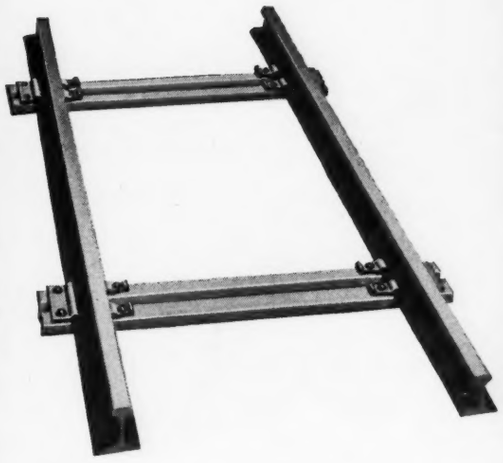
With its complete shop devoted to building mine cars, Bethlehem can often save you time and expense by fabricating new car bodies, or by cutting and punching car sides, bottoms, ends and other parts, ready for repair jobs in your own shops. This is of particular advantage if any wholesale car-repair program is contemplated.

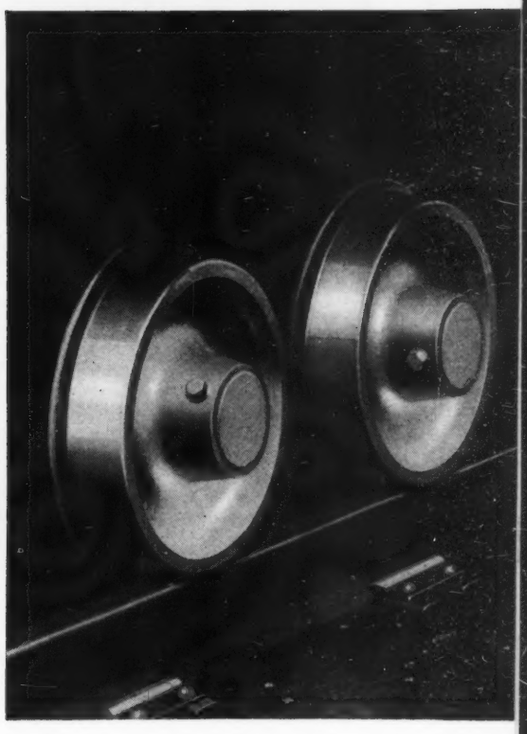
Bethlehem Products for the Mining Industry: Rails . . . Steel Ties . . . Frogs, Switches, Switch Stands, Turnouts and Special Trackwork . . . Track Bolts, Nuts, Spikes . . . Mine Cars . . . Wheels, Axles . . . Bars, Plates, Structural Shapes . . . Steel Construction . . . Steel Timbering . . . Pipe, Boiler Tubes . . . Galvanized Roofing, Siding . . . Wire, Nails, Fence . . . Wire Rope, Strand . . . Drill Steel . . . Forgings . . . Castings . . . Pig Iron.

BETHLEHEM STEEL

your June operations







Steel Timbering lasts longer

AS A MATTER of dollars-and-cents economy, many a main haulage should be timbered with steel beams for the horizontal members. One mine, which has used steel timbering for 20 years, figures that wherever a main haulage will be used more than 14 years, steel is cheaper as well as better.

No specific recommendations on sizes can be given without studying roof conditions. However, a 6-inch wide-flange beam, weighing 15½ lbs. per foot, is more than equivalent to an 8 x 8 wood timber; an 8-inch 17-lb. steel beam is stronger than an 8 x 10 timber.

Bethlehem will be glad to make recommendations based on the load to be supported or on the type of steel beam to replace a satisfactory wood timber. In many cases such advice will save considerable money, particularly where rails have been used in place of beams with more economical sections.

For tunnel work . . . Portable Track

PORTABLE track sections often form a more practical way of advancing track than extension rails. When this is true, Bethlehem Steel Ties can be used to build up rugged, accurately gaged sections—4, 6, 8 or more feet in length.

Bethlehem Steel Ties have riveted clips which set and hold the gage and lock the rail in place so firmly that sections are rigid and sturdy. It takes only a few minutes to build up the sections, only a matter of seconds to bolt them to the track.

When replacing this temporary track, steel ties of the same type can be used. They are faster to install, faster to remove. They give the rails the firm base required by heavy loading machines. And they keep track to gage. Experience shows that whenever track is relaid frequently, steel ties will save enough within a few months to write off their entire cost.

Lifetime wheels for Mine Cars

BETHLEHEM makes a forged-steel wheel for mine cars that will generally last the life of the car itself. These wheels are tough as well as hard. They remain remarkably free from chipping, cracking, or broken flanges. Since they are interchangeable with other types of wheels, they can be used as replacements at any time as well as on new cars.

Bethlehem Forged-Steel Wheels are designed to use any type of anti-friction bearing. Mounted, with the bearing in place, they are practically dust-proof, and can be greased by the usual pressure-gun method.

Quality steel axles are also made by Bethlehem for mine cars. Both the wheels and the axles are produced in the same plant as railway wheels and axles. Nearly fifty years of experience stands behind these Bethlehem mine-car wheels and axles.

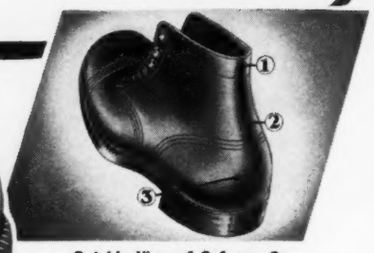
BETHLEHEM STEEL COMPANY

ANOTHER EXCLUSIVE HY-TEST FEATURE

Saf-eze

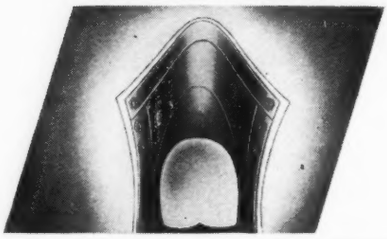
ONE-PIECE BACK

For foot-conforming comfort, flexibility and longer wear.



Outside View of Saf-eze One-piece Quarter
1. No ripping at the back. 2. No binding or rubbing in the tendons. 3. No rubbing in the heel.

Inside View . . Note the smooth, glove-like inside fit of the one-piece seamless quarter. No ridge or seam to cause friction blisters or discomfort.

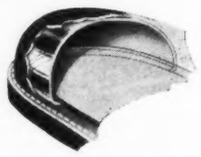


HERE'S another reason why the men in your mines should wear Hy-Test Safety Shoes . . . the Saf-eze one-piece back. This smooth seamless section conforms snugly to the foot and gives dress shoe looks and comfort. It moves with the foot not against it . . . thus eliminating raw blistered heels.

Saf-eze is exclusive with Hy-Test. So is the steel box toe with the patented anchor flange. This "turret top" has saved thousands of workers' toes and thousands of compensation dollars.

There are Hy-Test models especially suitable for each mining job . . . on the surface or underground. Five lasts and complete range of sizes assure quick, proper fitting. Write for booklet describing, illustrating, and pricing the complete line.

"TURRET TOP" TOE PROTECTION!



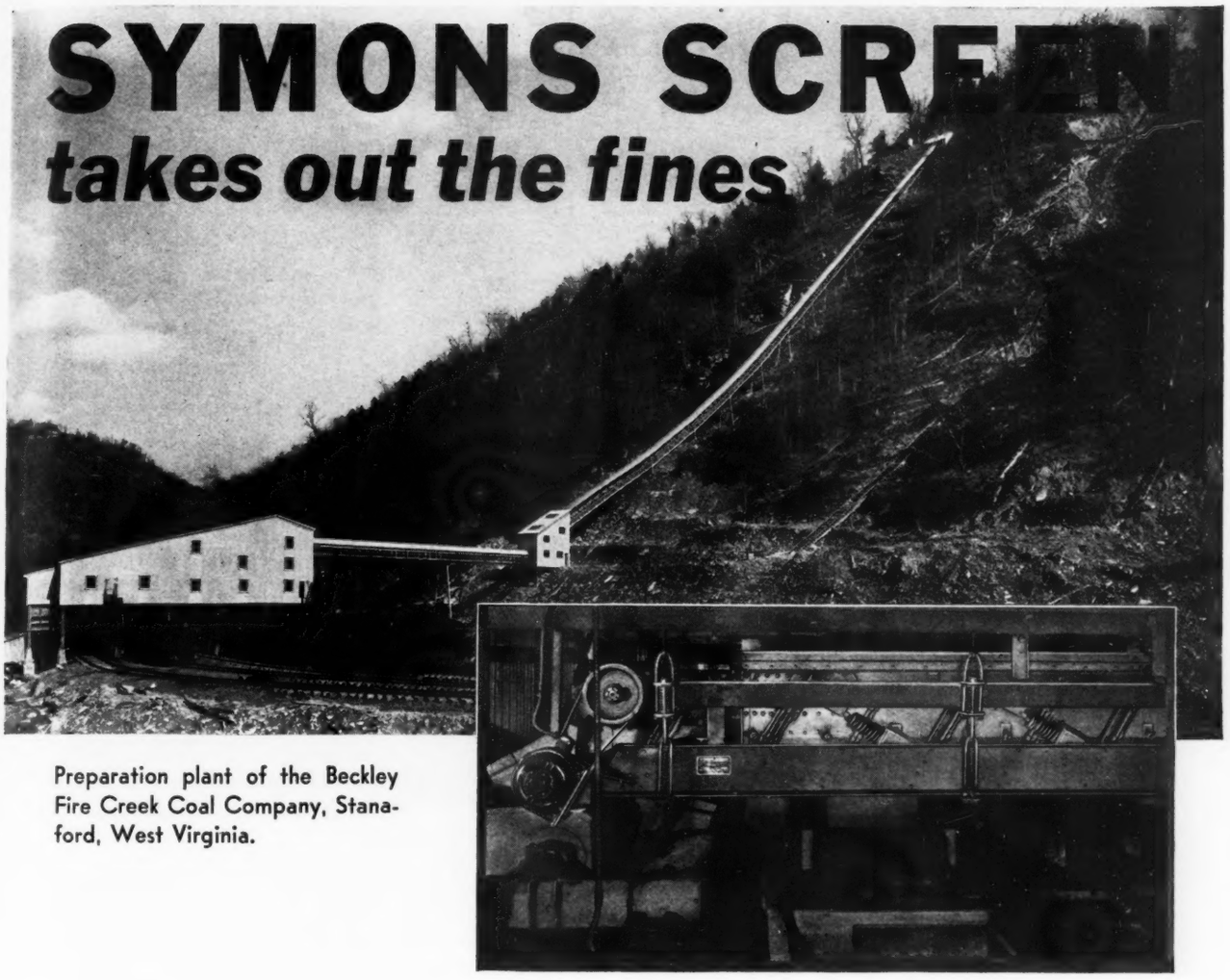
Hundreds of workers are on their feet today because Hy-Test Safety Shoes were on their feet the day "the accident" happened. Reason: this steel toe cap with the patented anchor flange. The deep flange resists against spreading outward when struck and eliminates any sharp edge that could cut down through sole materials, lower the box and imprison toes.

HY-TEST INTERNATIONAL SHOE CO. SAFETY SHOES

HY-TEST SAFETY SHOES

Designed and Manufactured Exclusively by Hy-Test Division,
The International Shoe Co., St. Louis, Mo., The Nation's Largest Shoe Manufacturer

SYMONS SCREEN
takes out the fines



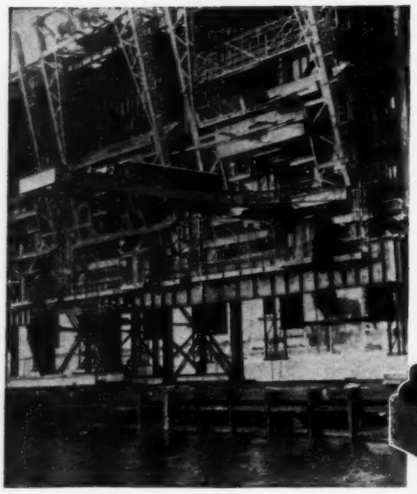
Preparation plant of the Beckley Fire Creek Coal Company, Stanaford, West Virginia.

The flat Symons Screen is furnished in a range of sizes and deck combinations to meet any requirement for coal screening.

In the new preparation plant built by the Kanawha Manufacturing Company for the Beckley Fire Creek Coal Company, a 4 x 12 foot Symons Screen was installed to remove the fines from the 0 to 1 1/4" feed. The top deck has 3/8" x 4" slotted openings, while the lower deck is a conveying pan for collecting and carrying the fines forward to discharge into the conveyor beneath the screen. The upper deck is equipped with a vibrating discharge. With the Symons Screen set level, the low headroom required, closer sizing and less degradation, it lends itself to modern preparation plant construction and higher standards of coal screening.

NORDBERG MFG. CO., MILWAUKEE WISCONSIN

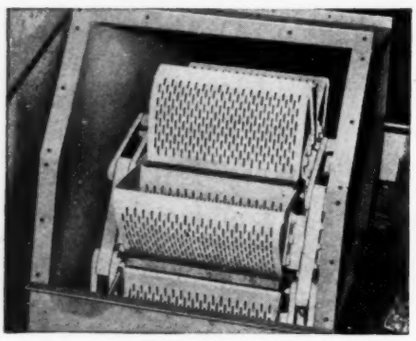
Want your equipment to weigh less ...last longer...do more work?

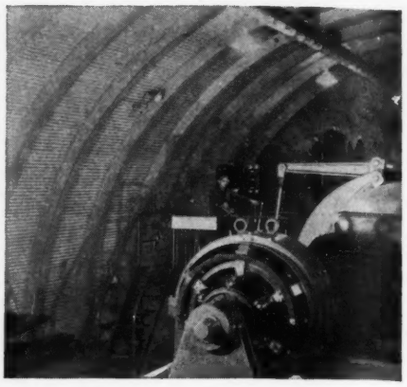


Lightweight COR-TEN *boom saves new pier construction.* To meet weight restrictions imposed by the limited supporting capacity of the existing pier structure, drastic weight savings were effected in this side wall loading machine by building the boom of U·S·S COR-TEN.

COR-TEN *Mine Car Body weighs 25% less,* carries approximately 26% more payload than a car body of similar dimensions built of standard structural steel. Principal weight saving was accomplished by reducing thickness of sides and ends from 3/16″ to ¼″, the floor from 5/16″ to ¼″, without any reduction in strength or durability.

COR-TEN *Elevator Buckets Last 40% Longer.* 82 COR-TEN-built buckets in this coal washing plant elevate wet refuse, slate and other foreign material. In addition to the abrasion encountered when the buckets drag their load from the bottom of the elevator, they are subjected to severe corrosive action due to alternate wet and dry conditions caused by 8-hour daily shutdown.





U·S·S COR-TEN *roofs a hoist room 2000 ft. underground.* ¼″ corrugated U·S·S COR-TEN sheets supported on cambered COR-TEN I-beams, line this hoist room of the Sullivan Mining Co. mine at Gem, Idaho, built two miles into the mountain. COR-TEN used in place of the concrete block construction originally planned, provides the great strength required to withstand the hazards of falling rock and also assures superior resistance to the corrosive action of mine water. "U·S·S COR-TEN," say the owners, "has given very satisfactory service."

BECAUSE U·S·S COR-TEN has a yield point approximately twice as high as ordinary structural steel and is 4 to 6 times more resistant to atmospheric corrosion, its most obvious advantage in mining equipment is in reducing deadweight. And COR-TEN has done a magnificent job in this respect.

But COR-TEN has other superiorities over structural quality steel. It is tougher, better able to resist impact, shock and vibration. Its abrasion resistance is almost one-third greater. That's why you'll find U·S·S COR-TEN being used more and more, not alone to decrease the drag of deadweight, but to increase the *life* of equipment — to fight corrosion — to decrease wear—to give added strength and durability to parts subjected to destructive stress and strain.

A few such COR-TEN applications are illustrated here. They were developed by designers of coal mining equipment who were determined to use to the full extent the many advantages this versatile steel offers.

In your equipment there must be many places where U·S·S COR-TEN steel will justify its use on a basis of economics. Where it will lengthen useful life — where it will give you an added sales feature — where it will show advantageously on the profit sheet of the user.

All we ask is the opportunity to go over your designs with you—to show you what others have done—to prove how readily U·S·S COR-TEN can be applied—and how little it costs to use.

This symbol represents the highest quality, the finest metallurgical service.

HIGH TENSILE STEELS

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
NATIONAL TUBE COMPANY, *Pittsburgh*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

Scully Steel Products Company, Chicago, *Warehouse Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL